DOCUMENT RESUME

ED 293 733 SO 017 904

AUTHOR Meijer, H.
TITLE Compact Geography of the Netherlands. Fifth Edition.
INSTITUTION Information and Documentation Centre for the Geography of the Netherlands, Utrecht.; Netherlands Ministry of Foreign Affairs, The Hague.
PUB DATE 85
NOTE 44p.; For Third Edition, see ED 190 419.
PUB TYPE Reference Materials - Geographic Materials (133) -- Guides - Classroom Use - Materials (For Learner) (051)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Foreign Countries; *Geography; Instructional Materials; *Maps; Secondary Education; Social Studies
IDENTIFIERS *Netherlands

ABSTRACT

A short, concise summary of the geography of the Netherlands is presented in this document. The introduction describes the country's governmental forms, physical location, provinces, population, and history. Geographic coverage includes: (1) the high and low Netherlands; (2) the struggle against flooding and land reclamation; (3) the polders, or land surrounded by dikes; (4) the Zuyder Zee; (5) the Delta Project; (6) water control; (7) demography; (8) population distribution; (9) the Randstad, cities located in western Netherlands; (10) Amsterdam and Rotterdam; (11) the economy; (12) agriculture; (13) mineral production; (14) industry; (15) trade and traffic; (16) physical planning; and (17) the environment. Full-page maps accompany each of these topics. (JHP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED293733

Compact Geography of the Netherlands

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
H. MEIJER

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SO017904

Contents

Foreword 3
Introduction 4
The High and Low Netherlands 6
Struggle against Flooding – land reclamation 8
Polders 10
The Zuyder Zee Works 12
The Delta Project 14
Water control 16
Demography 18
Population distribution 20
The Randstad 22
Amsterdam and Rotterdam 24
The Economy 26
Agriculture 28
Mineral production 30
Industry I 32
Industry II 34
Trade and traffic 36
Physical Planning I 38
Psysical Planning II 40
The Environment 42

Cover photograph: reduced satellite picture of the Netherlands.
Copyright Malmberg Den Bosch (ITC).

Published by the Ministry of Foreign Affairs, The Hague, in conjunction with the Information and Documentation Centre for the Geography of the Netherlands (IDG), Utrecht.
Composition/text: H. Meijer, IDG.
Production: Government Information Service, The Hague.
Graphics: Theo Woudstra, Cartographic Laboratory, Geographical Institute, Utrecht.
Design: 'Full House', The Hague.
Lithography: Koningsveld en Zn. BV, Leiden.

Foreword

The first edition of the *'Compact Geography of the Netherlands'* was compiled in 1970 by the Information and Documentation Centre for the Geography of the Netherlands (IDG) at the request of the Ministry of Foreign Affairs in The Hague. In 1963 the Council of Europe requested its member countries to appoint experts in the field of geography to arrange the exchange of information in order to effect an improvement in the accounts of the geography (or elements of the geography) of their countries in the textbooks. This request led to the establishment of the IDG in Utrecht in 1964 and of an IDG Office in 1971. The stream of requests for information grew every year. The correspondence showed the need for a short summary of the geography of the Netherlands.

Both the time devoted to the subject of geography in the curriculum and the teaching methods used vary from country to country. For this reason an arrangement was chosen from which each user can take what he needs, although of course the possibility remains that in view of the differences between countries, the material provided will comprise too much for some and not enough for others.

The present version is the fifth impression. Not only have the contents of the last wholly revised version (third edition) been updated, but they have been drastically revised and supplemented in various places. The cartographic material has also been subject to a number of amendments. At the same time, a substantially amended second edition of the *'Pictorial Atlas of the Netherlands'* is being issued. This is a closely related publication to the 'Compact Geography' and was first published in 1977.

These booklets are intended for students of geography and teachers in secondary schools and the higher classes of primary schools. They are designed to serve in part as a commentary to the *'School Map of the Netherlands'* (scale 1:325,000), which is also published by the Ministry of Foreign Affairs in collaboration with the IDG. In order to keep users regularly supplied with recent data, an annual *IDG Bulletin* is also published.

For further information, documentation or literature lists on the geography of the Netherlands, readers are invited to contact the Office of the Information and Documentation Centre for the Geography of the Netherlands, Rijksuniversiteit, P.O. Box 80115, 3508 TC, Utrecht, The Netherlands.

Writers of textbooks are permitted to reproduce the maps and text excerpts from this booklet, provided they acknowledge the source. Photographs to illustrate such books may also be obtained on request from the IDG or from the Netherlands Embassies in the various countries.

Utrecht/The Hague, 1985

Introduction

The impression of the Netherlands which exists in the minds of many people in other countries is amply confirmed by the view which greets the eye of the traveller flying into the airport of Schiphol near Amsterdam. The country is flat, it is low-lying and is crossed by numerous water courses.

In large parts of the country permanent occupation did not become possible until the construction of dikes enabled people to withstand most of the onslaughts of the sea. Only in the extreme southeast do altitudes above 200 metres occur.

The Dutch have traditionally made good use of the country's situation on the sea and rivers, so that it was precisely the western, low-lying coastal areas which became the most densely populated.

The fact that the country's economic centre of gravity has been located since the end of the Middle Ages in these areas, which later became the provinces of North and South Holland, has resulted in the Netherlands becoming known abroad mainly under the name of *Holland*, although the latter designation refers, in fact, to only two of the eleven (as of 1986, twelve) provinces.

The concentration of population in the western coastal provinces has also brought problems in such fields as housing and recreation, traffic an environmental pollution. Before these aspects are dealt with in the following chapters, some general information is provided.

Form of government

The Netherlands is a parliamentary democracy under a constitutional monarchy. The head of state is H.M. Queen Beatrix.

The Parliament consists of two houses: the Lower House, the 150 members of which are elected by universal suffrage, and the Upper House of 75 members, who are elected by the members of the Provincial Councils.

The capital is Amsterdam, but the seat of government is The Hague.

Situation

The Netherlands, which covers an area of 37,291 km^2 is situated on the west side of the Eurasian continent between approximately 50°45' and 53°30' north latitude and 3°30' an 7° east longitude. It is among the smaller West European countries, with an area somewhat larger than that of Belgium and rather smaller than that of Switzerland or Denmark.

The country is situated on the North Sea and at the mouths of the rivers Rhine, Maas and Scheldt. Physically, the Netherlands is a delta and forms part of the plain of northern and western Europe.

The highest point is located in the extreme southeast at 321 m. and the lowest point is north of Rotterdam at 6.70 m. below sea level (see map on p.7). 27% of the total land area is below sea level and this part of the country is inhabited by about 60% of the total population. From its situation the Netherlands derives a temperate maritime climate, with an average January temperature of 1.7°C and a July average of 17°C. The total annual precipitation of nearly 800 mm is distributed fairly evenly throughout the year.

The climate brings both advantages and disadvantages for the population and the economy. The mild and moist conditions are favourable for livestock farming, as well as for the market gardening in the coastal areas. On the other hand, there is insufficient summer sun for many arable crops. Navigation is seldom hindered by ice during the generally mild winters. The many changes in the weather (changeability is one of the chief characteristics of Dutch weather) often result in fog and slippery road conditions during the winter.

Provinces and population

The Netherlands is divided into eleven provinces, which are divided in turn into 750 municipalities. With 14.4. million inhabitants (1 Jan 1984) – i.e. an average of 424 per km^2 of land – it is among the most densely populated countries in the world. As from 1 January 1986, the IJsselmeer polders (southern and eastern Flevoland and the North-East Polder) will together constitute the twelfth province with Lelystad as its capital.

Historical notes

At the beginning of the Christian era the southern half of what is now the Netherlands formed part of the Roman Empire. Cities such as Nijmegen and Utrecht arose as frontier settlements at that time.

During the Middle Ages the area consisted of a number of autonomous dukedoms (Gelderland, Brabant), counties (Holland, Zeeland) and the bishopric of Utrecht. During the first half of the 16th century, under Charles V, these were all absorbed into the great Burgundian-Hapsburg Empire, from which the Netherlands freed itselfs during an 80-year war of liberation (1568-1648).

During the 17th century, known as the 'Golden Age', the Dutch built up a world-wide trading network, with trading stations (factories) along many coasts. Large trading companies often controlled whole states and complexes of states (including Indonesia, Sri Lanka, parts of Brazil and southern Africa).

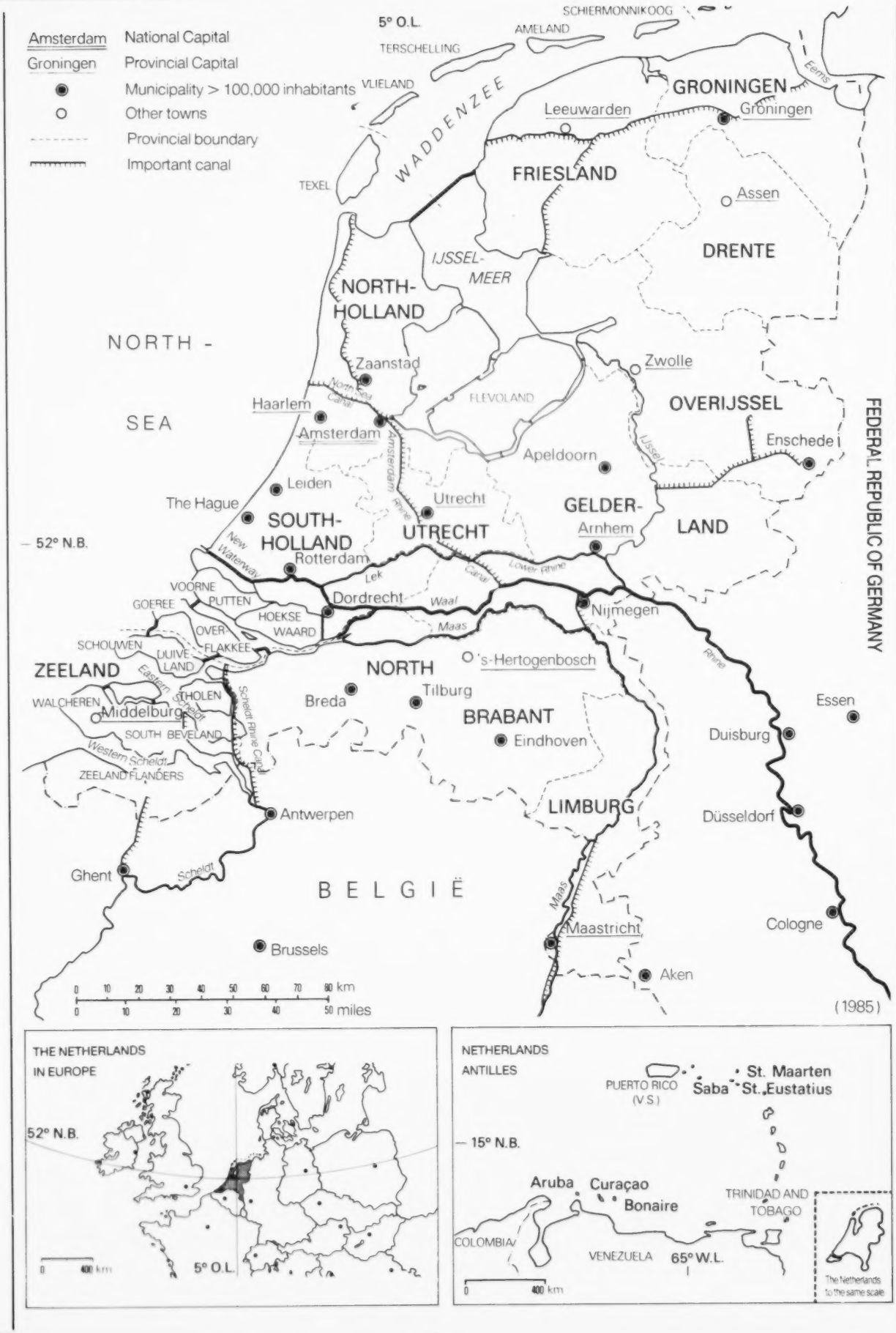
In the Netherlands itself art and culture flourished at that time (Rembrandt, Vondel). When the other European states began to protect their own growing trade and industry, Dutch commerce entered a period of stagnation.

During the Napoleonic period the Netherlands formed part of the French empire and in 1815, after the fall of Napoleon, the Kingdom of the Netherlands, including what are now Belgium and Luxembourg, was created. Belgium became independent in 1839 and the personal union with Luxembourg ended in 1890.

During the Second World War the governments-in-exile of the Netherlands, Belgium and Luxembourg decided to establish a customs union when the war ended and in 1960 this was expanded into an economic union, serving as a model for the European Economic Community.

The Netherlands is a member of various international organisations including the United Nations, the OECD and NATO.

In 1943, on the initiative of the late Queen Wilhelmina, a start was made on changing the political relationship with the colonies, which could choose to become partners enjoying equal rights within the Kingdom. Indonesia chose to go its own way in 1949 and Suriname became independent in 1975. The Netherlands Antilles – six islands with a combined area of under 1,000 square kilometres – still form part of the Kingdom of the Netherlands, although they enjoy a large measure of independence within the framework of the Kingdom. Only foreign affairs and defence are matters falling within the competence of the government of the Kingdom.


Amsterdam National Capital
Groningen Provincial Capital
Municipality > 100,000 inhabitants
Other towns
Provincial boundary
Important canal
5° O.L.
SCHIERMONNIKOOG
AMELAND
TERSCHELLING
VLIELAND
WADDENZEE
Eems
GRONINGEN
Leeuwarden
Groningen
TEXEL
FRIESLAND
Assen
DRENTE
IJSSEL-MEER
NORTH-HOLLAND
NORTH - SEA
Zaanstad
Zwolle
North Sea Canal
Haarlem
FLEVOLAND
OVERIJSSEL
Amsterdam
Amsterdam Rhine Canal
IJssel
Enschede
Apeldoorn
Leiden
The Hague
Utrecht
GELDER-LAND
SOUTH-HOLLAND
UTRECHT
Arnhem
52° N.B.
New Waterway
Rotterdam
Lek
Lower Rhine
Canal
VOORNE
PUTTEN
GOEREE
Dordrecht
Waal
Nijmegen
HOEKSE WAARD
Maas
OVER-FLAKKEE
SCHOUWEN
DUIVE-LAND
ZEELAND
's-Hertogenbosch
NORTH
Rhine
Eastern Scheldt
THOLEN
Breda
Tilburg
Essen
WALCHEREN
Middelburg
Scheldt Rhine Canal
BRABANT
Eindhoven
Duisburg
SOUTH BEVELAND
Western Scheldt
ZEELAND FLANDERS
LIMBURG
Antwerpen
Düsseldorf
Ghent
Scheldt
BELGIË
Maas
Maastricht
Cologne
Brussels
Aken
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
(1985)
FEDERAL REPUBLIC OF GERMANY
THE NETHERLANDS IN EUROPE
52° N.B.
0 400 km
5° O.L.
NETHERLANDS ANTILLES
PUERTO RICO (V.S.)
Saba
St. Maarten
St. Eustatius
15° N.B.
Aruba
Curaçao
Bonaire
TRINIDAD AND TOBAGO
COLOMBIA
VENEZUELA
65° W.L.
0 400 km
The Netherlands to the same scale

The High and Low Netherlands

The Netherlands without dikes

If the Netherlands was to lose the protection of its dunes and dikes, the most densely populated part of the country would be inundated (largely by the sea, but in part also by the rivers). This part of the Netherlands, which generally does not lie higher than 1 metre above sea level, covers more than half the total area of the country. About a half of this in turn, i.e. 27% of the total area of the Netherlands, actually lies below sea level. This part of the country is called the 'Low Netherlands', while the area shown in grey on the map is termed the 'High Netherlands'. This situation is the result of the course of the country's geological history.

Geology

The rocks formed up to and including the Tertiary generally lie below the surface in the Netherlands, dipping from southeast to northwest. Only at a few places in the southeast and east of the country do these rocks, which include limestone, appear at the surface.

The surface of the Netherlands consists almost entirely of sediments laid down during the Quaternary period. In the penultimate Pleistocene glaciation – the Riss or Saale period – large ice sheets pushed out from northern Europe over the Netherlands, with outliers reaching to the line Haarlem-Nijmegen. In the south-north trending river valleys of what are now the provinces of Utrecht, Overijssel and Gelderland (the Central Netherlands) the valley walls were pushed sideways and upwards to form what are now elongated ridges (the 'push moraines', which reach a height of over 100 metres and form a recreational area of national significance).

Because of the considerable fall in sea level, the coastline of the North Sea lay much farther to the northwest during the ice ages. After the ice had melted there remained an extensive area of glacial drift in the north of the country, consisting of sand, gravel, boulder clay and erratics.

Even before the Ice Age the rivers Rhine and Maas had deposited thick layers of sand and gravel, originating in the Alps and the European *mittelgebirge*, in the central and northern parts of the Netherlands.

After the disappearance of the ice sheets the north-westerly and westerly winds blew sand, coming in part from the dried-up floor of the North Sea, over the Netherlands. This sand largely covered the ground moraine, the push moraines and the river deposits. In the ensuing Holocene period the climate became warmer and the sea level rose. The North Sea flooded the Netherlands as far as the line Groningen-Utrecht-Breda. The cross-section of the western Netherlands shows clearly that the Pleistocene strata dip towards the west. In the Low Netherlands, long piles – once of wood, but now of concrete – for the foundations of buildings, viaducts etc. have to be driven through the Holocene clays and peats into the underlying Pleistocene sand (see the cross-section).

During the periods in which the rise in sea level took place, sand bars were thrown up in the western Netherlands running parallel to the present coastline. In the course of time they were transformed into low dunes, now referred to as the 'old dunes'. In about the year 1000 A.D. renewed dune formation occurred. These 'young dunes' are higher (the crests reach from 20 to 40 metres above sea level) and are situated partly to the west of and partly above the 'old' dunes. Behind the old dunes a kind of lagoon was formed, into which the sea was able to penetrate by way of gaps in the chain of dunes. Initially, clay was deposited in the lagoon, but later there was a growth of peat as the lagoon became increasingly shallow. Sometimes the peat was washed away by the sea, particularly in the south-west and northern Netherlands, where further marine clay was deposited. In the central part of the Low Netherlands the peat was later wholly or partly dug away in many places, leading to the formation of lakes. Where the latter were subsequently drained, polders were formed, with a floor of marine clay or peat.

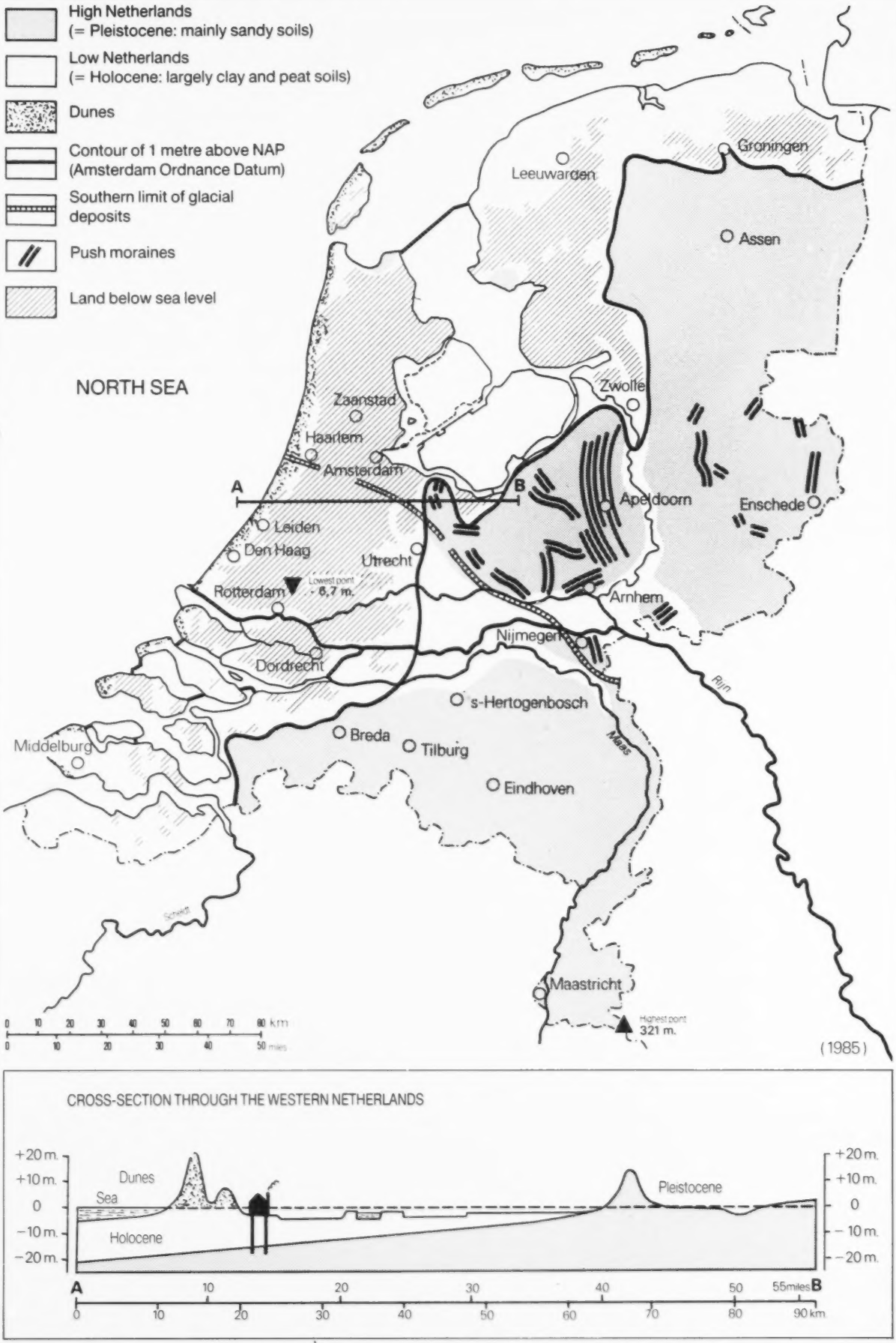
Peat formation also occurred in a number of marshy areas of the High Netherlands. The deposition of river sediments – predominantly sands and clays – was limited during the Holocene period largely to the region of the great rivers. The peat layers, in particular, in the Low Netherlands have subsided relative to sea level since the Middle Ages. This shrinkage of the soil resulted from the fact that it was necessary in this part of the country to control the groundwater level artificially, i.e. to lower it.

Topography

The Netherlands owes its great variety of topography to this relatively complicated geological history. In the first place, there is the major division into the landscapes of the 'High' and 'Low Netherlands'. The High Netherlands is locally more accidented than the flat west and north. It has mainly natural drainage and has proportionately the largest area of forest and heathland. It is also the oldest inhabited area; until well into the Middle Ages Utrecht was the country's most westerly city.

The landscape of the Low Netherlands is much more dominated by the struggle against the sea. It has largely been made habitable by human effort and the necessary civil engineering works are a marked feature of the flat countryside, in the form of ubiquitous dikes, drainage canals, locks, windmills, pumping stations etc.

The finer detail of the landscape is the result both of regional differences in the geological history briefly described above and of the diversity in the forms of human occupation, expressed in such things as land use, type of parcelling and farmhouses, urbanisation and traffic network.


High Netherlands
(= Pleistocene: mainly sandy soils)
Low Netherlands
(= Holocene: largely clay and peat soils)
Dunes
Contour of 1 metre above NAP
(Amsterdam Ordnance Datum)
Southern limit of glacial deposits
Push moraines
Land below sea level
NORTH SEA
Leeuwarden
Groningen
Assen
Zwolle
Zaanstad
Haarlem
Amsterdam
A
B
Apeldoorn
Enschede
Leiden
Den Haag
Utrecht
Rotterdam
Lowest point
- 6,7 m.
Arnhem
Nijmegen
Dordrecht
Rijn
s-Hertogenbosch
Breda
Tilburg
Maas
Middelburg
Eindhoven
Schelde
Maastricht
Highest point
321 m.
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
(1985)

CROSS-SECTION THROUGH THE WESTERN NETHERLANDS
+20 m.
+10 m.
0
−10 m.
−20 m.
Dunes
Sea
Holocene
Pleistocene
A
B
0 10 20 30 40 50 60 70 80 90 km
0 10 20 30 40 50 55 miles

Struggle against flooding – land reclamation

History

The rise in sea level after the last ice age greatly influenced the evolution of the map outline of what is now the Low Netherlands. Before this rise in sea level large parts of the North Sea were dry land and Great Britain was joined to the continent. Rivers such as the Rhine, the Thames and the Elbe flowed on well to the north of their present courses and did not empty into the sea until reaching north of what is now the Dogger Bank. After the sea level had reached approximately the present coastline, the rise became slower and more irregular. At times of relatively rapid rise, known as transgression phases, extensive coastal areas were swallowed up by the sea.

After about 700 B.C. the sea sometimes advanced so far that areas of peat behind the dunes were washed away. In the south-west and northern Netherlands only islands remained. The former Zuyder Zee, which reached its greatest extent in about 1250 A.D., was also formed in this way.

The inhabitants of the Netherlands have themselves also contributed to the loss of land through the digging of peat, which was used as fuel and for the extraction of salt in the coastal districts. In the peat region of the provinces of North and South Holland and Utrecht, in particular, the lakes continually increased in size. The struggle waged by the inhabitants of these areas against the sea was at first purely defensive in character. They first built homes or villages on artificial mounds know as 'terps'. When they began to link the 'terps' together by means of dikes, they also created the possibility of keeping the land dry.

In the north of Groningen and Friesland, in particular, but also elsewhere in the Low Netherlands and in the region of the great rivers, there were thousands of these terps. Much later they were levelled, because the soil of which they consisted was an excellent fertiliser.

Advances in technique, such as the building of windmills with an upper section which could be turned into the wind, enabled the inhabitants to pass gradually from defence to the attack.

In the 17th century, the 'Golden Age', a start was made on draining some of the lakes referred to above, particularly in the province of North Holland. There were various reasons for this, such as the increased demand of the growing towns for food,the capital resources and business enterprise of the Amsterdam merchants, the ever-increasing technical potential of the windmills and the fear of floods. The process continued until well into the 19th century, by which time the windmill had been replaced by the steam pump. An example is the 18,000 hectare Haarlemmermeer (Haarlem Lake) southwest of Amsterdam, where the State actively participated for the first time in the drainage work. The very low-lying polders in the area to the north of Rotterdam were also created at this time. The bar chart shows the area of land reclaimed in each century during the period from 1200 to the present day.

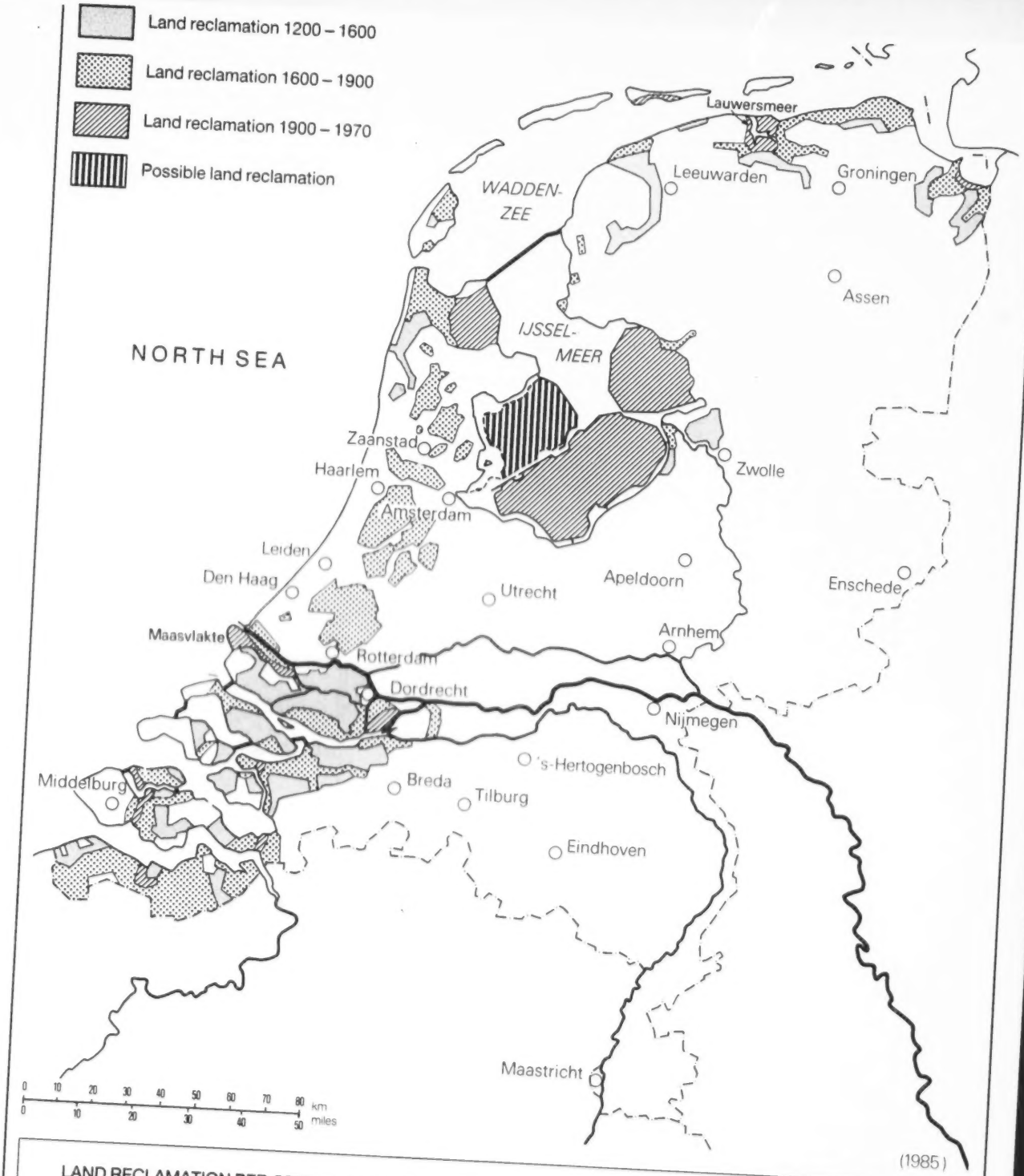
In the archipelago of the south-west Netherlands and in the coastal areas of the northern Netherlands land reclamation was already taking place in 1200, but this occurred in a different manner. The sea flowed in twice a day at high tide and let behind sand and silt as it retreated. When this process had continued for long enough, these areas came to lie above sea level, at least if no storm surges occurred for a long time. The silted-up lands were surrounded by a dike to protect them against the sea. In the north of Groningen and Friesland a system was developed in the 19th century to accelerate the accretion process. This took the form of building low dams out into the sea, behind and between which sand and silt could quietly settle. This process is still going on today.

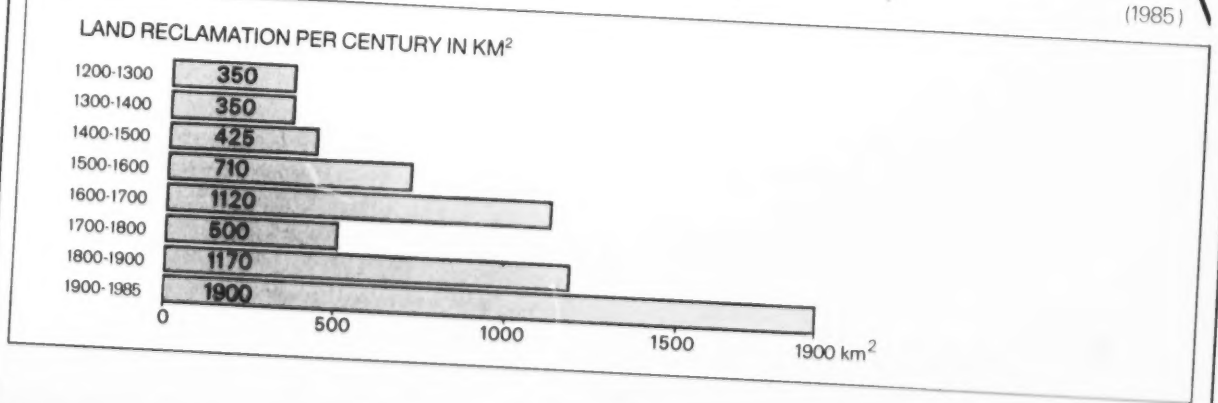
The 20th century

After 1900 land reclamation was undertaken on a still larger scale. An ambitious plan was drawn up for reclaiming part of the Zuyder Zee. The first polder, the Wieringermeer, was drained in 1930, by which date the steam pump had been replaced by diesel and electrically driven pumps. In 1932, the Zuyder Zee – subsequently called the IJsselmeer (Lake IJssel) – was sealed off from the Waddenzee by a 30-kilometres barrier dam. Four of the five projected polders have been completed (see further pp. 12 and 13).

Smaller areas reclaimed from the sea in the very recent past are the Lauwerszee (on the north coast between Friesland and Groningen) and the Maasvlakte, south of the entrance to the New Waterway, reclaimed to permit the expansion of the Rotterdam-Europort port and industrial zone. Landscape experts and biologists, among others, raised great objections to the partial reclamation of the Waddenzee. This sea, most of which falls dry twice a day because of its shallow depth and great tidal range, forms an ornithological and recreational area which is unique in the world. It therefore appears extremely improbable that large-scale reclamation will ever take place here.

With this completion of land reclamation, the Dutch have won back virtually all the land that had to be abandoned to the sea during the course of the centuries. Archaeological finds, such as those made in the IJsselmeer polders, have shown that many of the areas reclaimed from the sea were inhabited in past ages.


Land reclamation 1200 – 1600
Land reclamation 1600 – 1900
Land reclamation 1900 – 1970
Possible land reclamation
NORTH SEA
WADDEN-ZEE
IJSSEL-MEER
Lauwersmeer
Leeuwarden
Groningen
Assen
Zaanstad
Haarlem
Amsterdam
Zwolle
Leiden
Den Haag
Utrecht
Apeldoorn
Enschede
Maasvlakte
Rotterdam
Arnhem
Dordrecht
Nijmegen
's-Hertogenbosch
Middelburg
Breda
Tilburg
Eindhoven
Maastricht
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
(1985)


LAND RECLAMATION PER CENTURY IN KM²
1200-1300 350
1300-1400 350
1400-1500 425
1500-1600 710
1600-1700 1120
1700-1800 500
1800-1900 1170
1900-1985 1900
0 500 1000 1500 1900 km²

Polders

Thousands of polders
Dunes and dikes protect the Low Netherlands against flooding. Almost the whole of the west and low north (c. 50% of the total land area) consists of polders: land which is usually surrounded by dikes and within which the groundwater level can be controlled.

More water generally enters a polder than disappears from it naturally or is used. Particularly during the period September to April there is a surplus. In order to keep the land dry and the ground water at an acceptable level that surplus has to be removed.

Water economy of a polder

In	Out
. precipitation	. consumption
. seepage*	. evaporation
	. surplus

** water which enters the polder through the soil and under the dikes via ground water.*

In the polders, control of the water level, rather than the nature of the soil, is the factor which determines the form of agriculture. In the older polders, reclaimed before about 1850 and pumped dry with windmills, the still rather inadequate methods used often did not permit the water level to be kept at more than ½ to 1 metre below the ground surface (in winter the water levels are on average ½ to 1 metre higher). In the polders created during the 19th (steam pumps) and 20th centuries (diesel and electric pumps) it is possible to maintain the water level at over 1 metre below the surface, even though the polders often lie at a considerably lower level. Because of the low water table, the soil of these very low-lying polders can generally be used for arable farming. The more swampy soils of the older polders can often be used only for grazing.

Water can incidentally also be let into many polders in the event of a threatened water shortage during a dry summer.

Polders do not necessarily lie below sea level, although this is the case with the IJsselmeer polders (3-5 metres below sea level) and with the polders created by the drainage of lakes (up to 6.7 metres, see p. 4).

The polders in the peat areas lie at about 1 metre below sea level. In the areas of young marine clay and along the rivers many polders lie above the average sea level, which means that it is not always necessary to discharge the water by means of a pump. In the marine clay polders along the coast of Groningen and Friesland, for example, it is sufficient to open the gates in the sluices of the drainage canals at low tide.

The total number of polders is some 5,000. The reason for this is that, in earlier centuries, pumping was carried out by windmills which were unable to pump dry a large area. As techniques became more sophisticated and steam, diesel and electric pumps were successively employed, the polders increased in size (cf. the IJsselmeer polders).

Pumping techniques
Two main types of polder can be distinguished on the map:

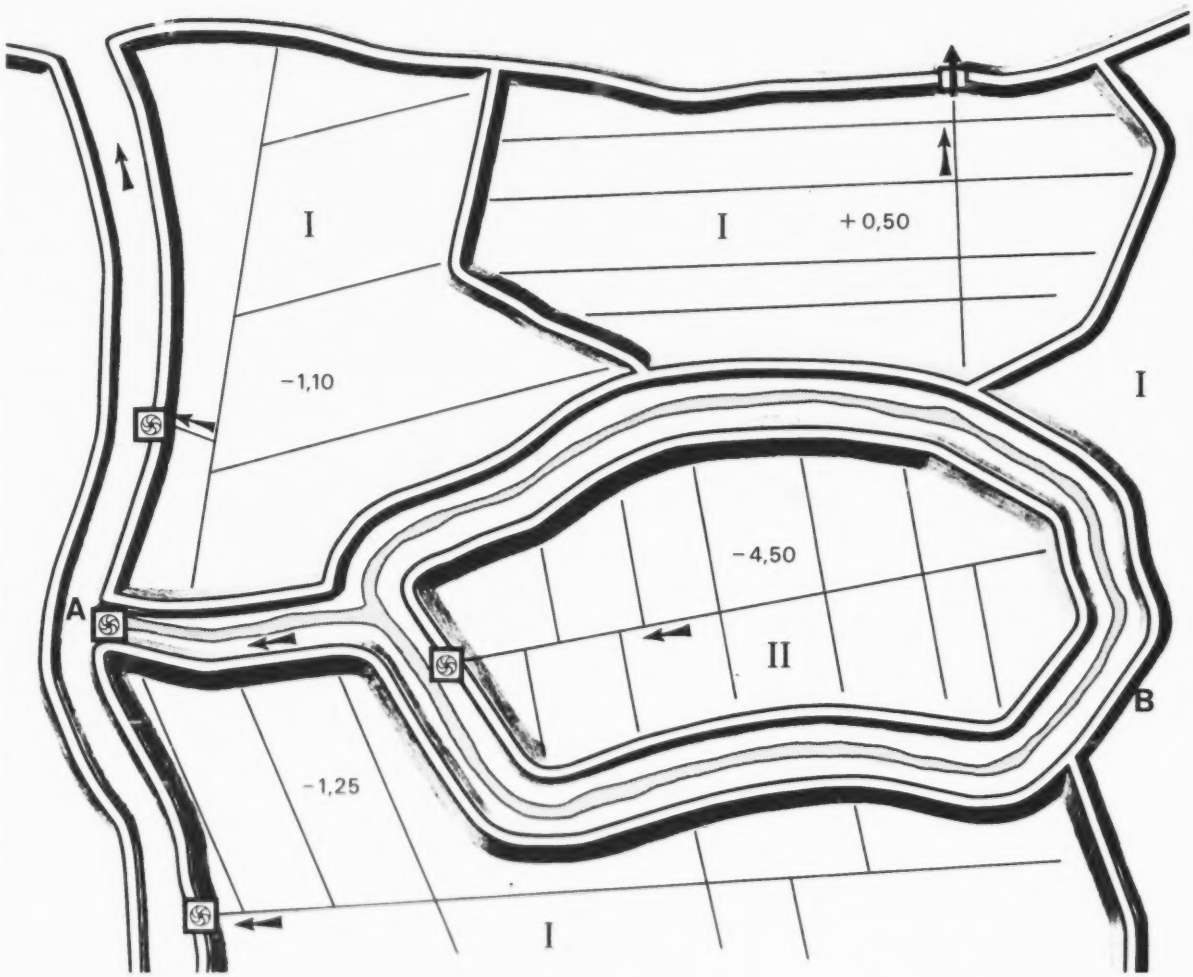
I polders surrounded by a dike and
II a polder surrounded by two dikes, separated by a ring canal.

The first type includes the river and marine polders situated respectively along a river or on the coast. Here, the surface water can generally be discharged directly to the sea or rivers, with or without the aid of pumping. The second type includes the drained lakes, known as 'droogmakerijen', which are usually very low-lying polders. The inner dike, situated around the former lake, is called the ring dike. It is surrounded by the ring canal, which borders the dikes of the neighbouring polders.

The cross-section shows a much-employed system of water control. Each polder has a specified groundwater level relative to the land surface – the polder datum. The desired level is determined mainly by the use to be made of the land. If the water rises too high at a particular moment, the pump is started and the surplus water is raised to the 'boezem', situated at a higher level. The 'boezem' is a system of lakes, canals etc., which functions as a temporary reservoir. From there the surplus water is discharged into the sea or rivers, either naturally, or by further pumping.

Polder organisation
As early as the Middle Ages the inhabitants of the polders were faced with the task of safeguarding an area by joint effort once it had been wrested from the sea. At that time the first 'waterschappen' (water control boards), of which there are now still 200 were created (because of reorganisation the number is continually decreasing). They are public bodies, falling under the jurisdiction of the provincial authorities. The Water Control Boards are elected by the 'ingelanden' (usually landowners in the polders). The members of the executive of the water control boards charged with the task of defence against the sea, the IJsselmeer or the great rivers are appointed by the Crown.

The activities of the water control boards traditionally lie in the field of the maintenance of the water defences, the water economy and the roads and waterways. New duties which have demanded increasing attention in recent decades, relate to the safeguarding of water quality, to nature conservation and the creation of opportunities for open air recreation. The financial means for carrying out these tasks are derived from a water control tax levied on the 'ingelanden', supplemented where necessary by grants from the central or provincial government.



Dike

Polder ditch

Pumping station

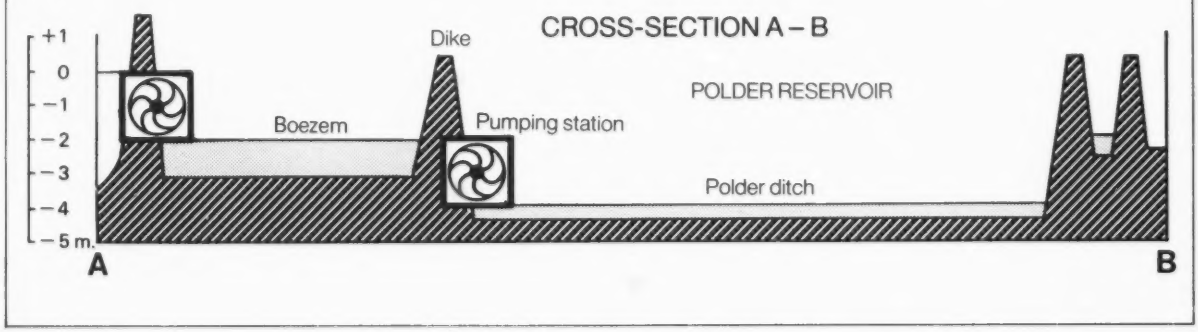
Boezem

External water (river and sea)

Direction of discharge of water

-4.50 Depth in metres below sea level

Discharge sluice (without pumping station)



The Zuyder Zee works

History

At the beginning of the Christian era the Zuyder Zee was a relatively small lake into which various rivers drained and which had a narrow connection with the North Sea. Because of the action of the tides and, particularly, of the wind, the lake was enlarged until it reached its ultimate, nearly circular, outline around 1250.

The oldest plans for drainage were those of Hendrik Stevin (1667). Towards the end of the last century, by which time the drainage question had become a matter of national concern, the engineer C. Lely, who was secretary of the Zuyder Zee Association, worked out the plan which was later to be carried out in its broad outline. It took the form of:

- a broad dam from the coast of North Holland to that of Friesland, turning the inland sea (Zuyder Zee) into a lake (IJsselmeer);
- along the coasts of the lake, where the bottom consisted largely of clay, five large polders, which would increase the surface area of the Netherlands by about 6% (about 2,050 km^2);
- in the north, where the majority of the sandy soils and the greatest depths occur, a reservoir fed by the IJssel and other rivers and connected with the sea via sluices in the dam for the discharge of surplus water.

In 1920, when Lely was Minister of Transport and Public Works, a start was made on the execution of this plan, after a flood disaster in 1916 and food shortage during the First World War had emphasised its necessity. The first polder, the Wieringermeer, was drained in 1930. The 30-kilometre long Afsluitdijk (barrier dam) was completed in 1932. The North East Polder followed in 1942 and Eastern and Southern Flevoland in 1957 and 1968, respectively. The main function of the marginal lakes fringing the two Flevoland polders is to prevent the groundwater level in the neighbouring higher areas of the 'old land' sinking too far. Shore-based and water recreation have successfully developed on and along these marginal lakes.

Use of the reclaimed land

After the land has been opened up and made usable (a process which takes several years), the polders are laid out. The objectives of the planning of the polders are to achieve effective land division and optimum size of holding, good access by roads and canals and appropriate vegetation cover.

Ninety per cent of the land consists of soil which is excellently suited for agriculture and, in particular, to arable farming. The land which becomes available is exploited by the State during the first few years and then leased or sold to farmers who come from all parts of the country. In each polder a number of villages and one or more larger towns were planned as service centres. Of these, Lelystad is intended to expand into a centre for the whole of the southern IJsselmeer region.

As of 1 January 1986, the North-East Polder and the two Flevoland polders will make up the province of Flevoland. If the Markerwaard polder is drained, it will also form part of the province.

The original intention was to use the five projected polders almost exclusively to increase agricultural production, but after the Second World War the polders were also zoned for residential and recreational use and as sites for industries and sevices. The result of this was a marked change in the allocation of land use (see the table on this page and also – bottom right on the map page – the differences in the layout of the oldest and the most recent polders).

The reasons for this include changed circumstances (such as shifts in the economic structure and urbanisation) and the fact that the more recently drained polders are situated relatively close to the Randstad conurbation (see also p.22). The provisional layout plan for Southern Flevoland, illustrated opposite, gives an impression of what is intended. Like Lelystad, the town of Almere will function as a reception area for population and businesses from the agglomeration of Amsterdam in particular.

Towards the end of the century Lelystad will have a population of 100,000, while Almere, which consists of a number of separate nuclei, has a potential population of 250,000. An area for the planting of woodland has been reserved in the south of the polder while, in the northwest, there is an important nature reserve – the Oostvaardersplassen (East Indiamen Lakes). Consequently, at most 50% of the total area of this polder will ultimately be used for agriculture.

Because of further changes of attitude, occasioned by such factors as developments in European agriculture, increased concern for the environment and the decline in population growth, a discussion has been set in train on the question of whether it is desirable or justified to reclaim the final Zuyder Zee polder, the Markerwaard.

In 1980, the government declared itself in principle in favour of reclamation, but the final decision has not yet been taken, although the dike between Lelystad and Enkhuizen was completed as long ago as 1975. The latter, however, should not be regarded as superfluous should it be decided not to proceed with the reclamation of the Markerwaard, since it has an important function in the water economy in separating the marginal lakes and the Markerwaard from the remainder of the IJsselmeer. Moreover, the road over the dike provides a welcome shortening of the distance between the Central Netherlands and the north of the province of North Holland.

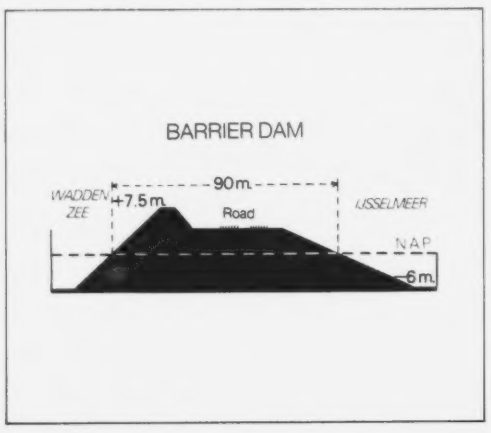
Impact on the surrounding areas

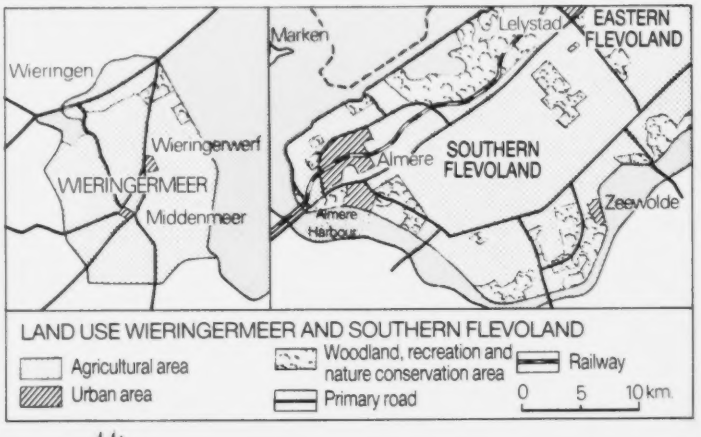
In the 'old land' surrounding the IJsselmeer the flood danger has been greatly reduced and an improved water economy has become possible. The roads over the Afsluitdijk and the dike between Enkhuizen and Lelystad and those through the new polders mean a shortening of the traffic links between the surrounding areas. The consequences were less favourable for a number of fishing villages around the former Zuyder Zee, although three sets of locks in the barrier dam permit the fishermen to continue their occupation on the open sea. The fishermen of the former island of Urk, in particular, avail themselves of this possibility.

Land use in %

	Wieringer-meer	North East Polder	Eastern Flevoland	Southern Flevoland
Agriculture	87	87	75	50
Woodland and nature areas	3	5	11	25
Residential	1	1	8	18
areas dikes, roads, water courses	9	7	6	7

WADDEN-
ZEE
BARRIER DAM 30 km.
1927-1932
Wieringen
Wieringerwerf
WIERINGERMEER
1927-1930
20,000 ha.
IJSSELMEER
120,000 ha.
PILOTPOLDER ANDIJK
40 ha. 1927
Enkhuizen
Hoorn
MARKERWAARD
?
41,000 ha.
Volendam
Marken
Amsterdam
NORTH EAST POLDER
1937-1942
Emmeloord
48,000 ha.
Urk
−4.5
−5.0
EASTERN FLEVOLAND
1950-1957
Lelystad
Dronten
54,000 ha.
IJssel
Kampen
SOUTHERN FLEVOLAND
1959-1968
Almere
43,000 ha.
Harderwijk
Coastline in 1920
Dike
Dike under construction
Pumping station
Lowest point in m. below NAP (average sea level)
Discharge sluice and shipping lock
Fixed bridge with locks
Bridge
Fresh water
Salt water
0 5 10 15 20 25 km
0 5 10 15 miles
(1985)


BARRIER DAM
WADDEN ZEE
+7.5 m.
90 m.
Road
IJSSELMEER
NAP
6 m.


Wieringen
Wieringerwerf
WIERINGERMEER
Middenmeer
Marken
Lelystad
EASTERN FLEVOLAND
Almere
SOUTHERN FLEVOLAND
Almere Harbour
Zeewolde
LAND USE WIERINGERMEER AND SOUTHERN FLEVOLAND
Agricultural area
Urban area
Woodland, recreation and nature conservation area
Primary road
Railway
0 5 10 km

The Delta Project

The south-western part of the Netherlands consists of an area of islands and peninsulas, between which the Rhine, Maas, Scheldt and their distributaries find their way to the sea. The area has had an eventful history, as shown by the constant changes in the map. Much land was reclaimed as a result of accretion and embanking and small islands grew together to form larger areas. Gains made in this way were, however, repeatedly lost through fresh flooding.

The disaster of 1953

The execution of the Delta Project was accelerated by the great storm surge which struck the low-lying polders of the South West Netherlands on 1 February 1953, causing over 1,800 deaths and inundating 160,000 hectares of land. This disaster was the result of a most unfortunate combination of circumstances: a deep depression, with north-westerly winds blowing at hurricane force straight onto the Dutch coast, coincided with the fortnightly spring tide when the sea had an exceptionally high water level.

The aims of the Delta Project were not only to reduce the flood danger through the construction of a number of dams, but also to achieve a general improvement in the water economy and increased accessibility of the archipelago. Land reclamation does not play a significant part in the scheme.

Implementation

As early as 1950 the Brielse Maas (an arm of the Maas) was closed off by a dam. The first work to be completed after the disaster of 1953 was a moveable storm surge barrier in the Hollandse IJssel, east of Rotterdam. If the water in the New Waterway (not sealed off because of the shipping interests of Rotterdam) is ponded up during a gale, this barrier serves to safeguard a large part of the polder land in the western Netherlands from flooding.

As the dates in the table indicate, two 'secondary' dams, situated farther inland, and the largest of the 'primary' dams, that in the Eastern Scheldt, have still to be completed. The whole project is due to be completed by 1987. The dikes along the open New Waterway and Western Scheldt have been strengthened.

The tidal range in the Delta region is about 3 metres. The strong tidal currents necessitated the development of new techniques for sealing the estuaries. These included closing the final gaps by means of caissons (concrete chambers as large as blocks of flats) and the use of overhead cableways to drop concrete blocks into the water. Seventeen large discharge sluices were built into the Haringvliet Dam (for the purpose of these, see pp. 16-17), while the Volkerak Dam contains locks for the use of shipping to and from the Scheldt-Rhine Canal.

Consequences

Through the implementation of the Delta Project the sea has largely been banished from the waters of the South West Netherlands. Besides the great advantage of the reduced danger of flooding, this also means that the struggle against the seepage of salt water – the enemy of farmers and growers in the whole of the Low Netherlands – can be waged more successfully. New potential has also been created for the supply of drinking water and for water sports.

A further important effect is the opening up of this previously isolated archipelago by the roads which have been or are being constructed over the ten dams and two bridges. This has set in motion radical changes in the traditionally agricultural Delta region. It is to be expected that industrial and commercial activities and the accompanying urbanisation will develop further, particularly in the north of the region (Rotterdam-Europort), in the east alongside the new land and water links between Rotterdam and Antwerp (including the Scheldt-Rhine Canal, which was opened in 1975) and in the south along the Western Scheldt (Vlissingen, Terneuzen).

The central zone must, however, retain its agricultural function, while the sea coast – with its wide area of dunes – and the inland lakes offer recreational possibilities, particularly to the inhabitants of the Randstad.

A radical scheme such as the Delta Project inevitably has its disadvantages. It was clear from the beginning that the coastal fisheries (mussels, shrimps etc.) and oyster cultures would suffer serious damage and become in certain places impossible because of the desalination of the water in the lakes behind the barrier dams. During the course of the 1960s an increasing number of protests were made on environmental grounds. The debate on the environmental aspects which continued for many years has ultimately resulted in far-reaching changes in the plans for sealing off the Eastern Scheldt. The primary dam is now being constructed in the form of a storm surge barrier incorporating 61 closable openings (to be closed only in the event of flood danger) which will enable salt water to enter the estuary and about 75% of the tidal movement to be maintained. As a result, serious damage to the natural environment in the Eastern Scheldt will be limited and the oyster cultures will not be destroyed. This change necessitates the building of two additional secondary dams in order to separate the waters farther east from salt and tides.

Dams and other civil engineering works in the South West Netherlands

No. on the map	Structure	Year of completion
1	Storm surge barrier in Hollandse IJssel	1958
2	Dam in Brielse Maas	1950
3	Dam with discharge sluices, Haringvliet	1971
4	Dam with drainage sluice, Brouwershaven Gap	1972
5	Storm surge barrier in eastern Scheldt	1986
6	Dam in Veerse Gat	1961
7	Zandkreek Dam, with shipping lock	1960
8	Grevelingen Dam with drainage sluice and shipping lock	1965
9	Volkerak Dam, with locks	1970
10	Philips Dam, with locks	1987
11	Oester Dam, with sluice	1986
12	Haringvliet Bridge	1964
13	Zeeland Bridge	1965
14	Scheldt-Rhine Canal	1975

REDUCTION OF DISTANCES BY ROAD

Distance from Rotterdam to Vlissingen before the Delta Project (via Roosendaal): 150 Km.

Distance from Rotterdam to Vlissingen after the Delta Project (via Zierikzee): 110 Km.

SHORTENING OF THE COASTLINE

Length of the coastline from A to B before the Delta Project: 800 Km.

Length of the coastline from A to B after the Delta Project: 80 Km.

Water Control

General
In the well-watered and densely populated Netherlands a high level of water control is necessary, both in the soil and in the rivers, lakes and canals. Many purposes can be served by this, such as the prevention of flooding and salination, guaranteeing sufficient depth of water for navigation and providing a domestic water supply for farms and industry.

Rhine canalisation
The Zuyder Zee and Delta Works are of great importance for water control, because they give increased security and provide freshwater reservoirs with a water level which can be regulated. In combination with a third project, the canalisation of the Lower Rhine, a better control of the water economy in virtually the whole of the Netherlands is now possible.

Three weirs incorporating shipping locks were built in the Rhine between 1958 and 1970. They were a completely new type of structure, consisting of two semicircular 'visor' weirs which can be lowered to hold back the water, but under which shipping can pass freely when raised. The easternmost of the weirs enables more water to be channelled along the Gelderse IJssel into the IJsselmeer, to the benefit, in particular, of navigation on the IJssel and of agriculture in the North and East Netherlands. Without further measures, however, the discharge of water to the sea by way of the River Lek would be so diminished as to render navigation impossible. Moreover, the salt water, which already penetrates inland above Rotterdam at high tide, would be able to reach even farther. To tackle the first problem two further weirs were built downstream in the Lower Rhine and Lek.

In order to prevent salination it is important that the waters of the Maas and Waal should be diverted to flow into the sea past Rotterdam by closing off the northern Delta waters. This is one of the main functions of the dams in the Volkerak and Haringvliet (see pp. 14-15), but in order to prevent flooding in the Rotterdam area, such as during periods of high water discharge by the great rivers, 17 discharge sluices have been incorporated in the Haringvliet Dam.

Water quality
The account given above relates mainly to matters of *quantity:* ensuring sufficient water for navigation and an optimum groundwater level, but there is also the increasing concern for water *quality*. Apart from the seepage of seawater, the water supply is threatened increasingly by pollution from the cities, both of the Netherlands and neighbouring countries, and from agriculture and industry. The rivers carry effluent from at least five neighbouring and more distant countries into the Netherlands. There is more about this on pp. 42-43 ('Environment'). Special attention will be devoted here to the specific problems of drinking water supply.

The supply of drinking water
The supply of drinking water is a matter of special concern in the polder region of the Low Netherlands. The cross-section shows that brackish and salt ground water come close to the surface here. Among the reasons for this is that, before the dunes were formed, this area was innudated by the sea. Moreover, the fresh surface water in the polders is being continually discharged, while salt water seeps up from under the dikes and dunes (see cross-section). As a result, the ground water in this area cannot everywhere be used for drinking, as it can in the High Netherlands and the dune areas. In order to prevent the exhaustion of the store of fresh water under the dunes, river water, brought by pipeline, is injected into the dunes at a number of places (see also p. 43).

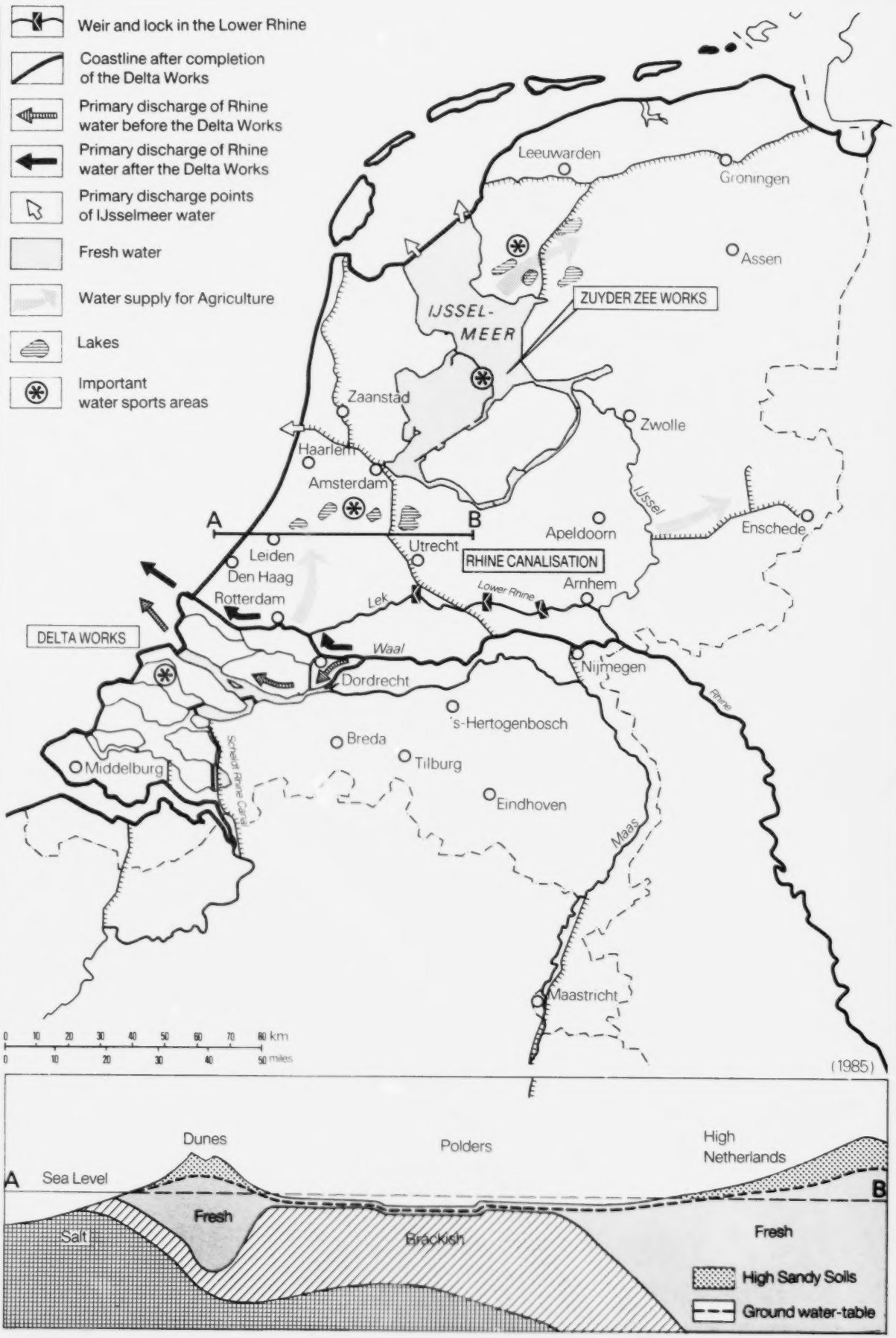
In the polder land, especially in the area around Rotterdam, the population has to rely on surface water which, particularly if it has to be taken from the rivers, is increasingly subject to pollution.

A great problem is the fact that nearly two thirds of the Netherlands' water supply comes from the heavily polluted Rhine. In an average year the supply is broken down as follows:
Rhine 63%
Maas 7%
minor rivers 3%
precipitation 27

Efforts are being made through international agreements and domestic measures to remove the *causes* of this pollution. In addition, attempts are being made in the Netherlands to deal with the *effects* in various ways, especially as they affect the water supply. This is being done not only through the usual treatment processes, but also by storing up the water during periods of high river discharge, i.e., when there is a relatively low level of pollution. This is being achieved by such means as injection in the dunes and storage in reservoirs. In the river area known as the Biesbosch, for example, to the south-east of Dordrecht, three reservoirs were constructed in the early 1970s. These are filled with water from the Maas, which is considerably less polluted than the Rhine. Water is conveyed from the reservoirs by pipeline to large parts of the South West Netherlands, including the area of Rotterdam.

Open air recreation
Water plays a part in open air recreation in many ways. Hundreds of thousands of people relax on the beaches and on the shores of lakes, beside open air pools etc. Angling, practised particularly on lakes and inland waters during the summer, is very popular. There are now about 1.4 million registered anglers (a licence is required), i.e., about 10% of the total population.

Water sports, for which a water area of 3,000 km^2 plus 30,000 km of waterways are available, are also expanding rapidly. Increasingly drastic measures are required for the control of water sports. There are lakes, for example, where the number of speedboats is strictly limited, and nature reserves where pleasure boating is completely forbidden. 'Traffic rules' have been drawn up to prevent hindrance to commercial shipping. Special locks for yachts have been built in the new major lock complexes such as those in the Volkerak and Philips dams.


Weir and lock in the Lower Rhine
Coastline after completion of the Delta Works
Primary discharge of Rhine water before the Delta Works
Primary discharge of Rhine water after the Delta Works
Primary discharge points of IJsselmeer water
Fresh water
Water supply for Agriculture
Lakes
Important water sports areas
Leeuwarden
Groningen
Assen
IJSSEL-MEER
ZUYDER ZEE WORKS
Zaanstad
Zwolle
Haarlem
Amsterdam
A
B
IJssel
Apeldoorn
Enschede
Utrecht
Leiden
Den Haag
RHINE CANALISATION
Arnhem
Rotterdam
Lek
Lower Rhine
DELTA WORKS
Waal
Nijmegen
Dordrecht
Rhine
's-Hertogenbosch
Breda
Tilburg
Middelburg
Scheldt Rhine Canal
Eindhoven
Maas
Maastricht
0 10 20 30 40 50 60 70 80 km
0 10 20 30 40 50 miles
(1985)
Dunes
Polders
High Netherlands
A
Sea Level
B
Fresh
Salt
Brackish
Fresh
High Sandy Soils
Ground water-table

Demography

Population growth

Since 1830, when the first census was taken, the population of the Netherlands has increased more than five times, from 2.6 million to 14.5 million on 1 January 1985. In general, immigration had only a small effect on this increase and it has largely to be attributed to natural growth.

The graph shows the changes in birth and death rates since 1900. The birth rate fell from 31.6 per thousand in 1900 to 11.8 per thousand in 1983, firstly because of the fall in the number of children per family and, secondly, because of a fall in the percentage of married women. The death rate declined from 17.9 per thousand in 1900 to 8.2 per thousand in 1983, thanks to improvements in medical care, social conditions and hygiene, as a result of which infant mortality in particular was reduced.

Around the two world wars there were sudden increases in both the birth and death rates. At the end of the First World War – in which the Netherlands remained neutral, but was affected by food shortages – a serious influenza epidemic caused many deaths, particularly among the elderly. The high death rates during the Second World War were mainly the result of the fighting at the beginning and end of the enemy occupation and of the food and fuel shortages during the 'Hunger Winter' of 1944-45. There was a 'bulge' in the birth rate shortly after both world wars.

During the 1960s the death rate showed a slight rise as a result of the relative growth in the numbers of people in the highest age groups. The convergence of the birth and death curves reflects the fact that, since about 1960, the natural increase has greatly declined. In 1960, the Netherlands, with a natural increase of about 13 per thousand – about the same as in 1900 – had by far the most rapidly growing population in Western Europe. Subsequently, the natural increase fell to 3.7 per thousand in 1983. This decline was incidentally partly compensated for between 1970 and 1980 by a considerable net migration gain, arising mainly from the arrival of immigrant workers and their families from the Mediterranean countries and of people from Surinam, which became independent in 1975.

The picture of foreign migration before 1970 was quite different. Around 1950 thousands of Dutch people migrated to such countries as Canada, the United States, South Africa, Australia and New Zealand. The peak year of 1952 showed a net migration loss of nearly 50,000 persons. Around 1960 emigration and immigration were approximately in balance. The largest net migration gain, of 72,000 persons, occured in 1975.

The net migration gain in 1983 amounted to only 5,900 persons, i.e., 9.4 per thousand. Mainly because of the continuing decline in the birth rate, the official estimate for the population of the Netherlands in the year 2000 has changed in scarcely ten years from 20 million to 15 million. It is now even anticipated that the population will begin to decline at the beginning of the 21st century.

Age structure

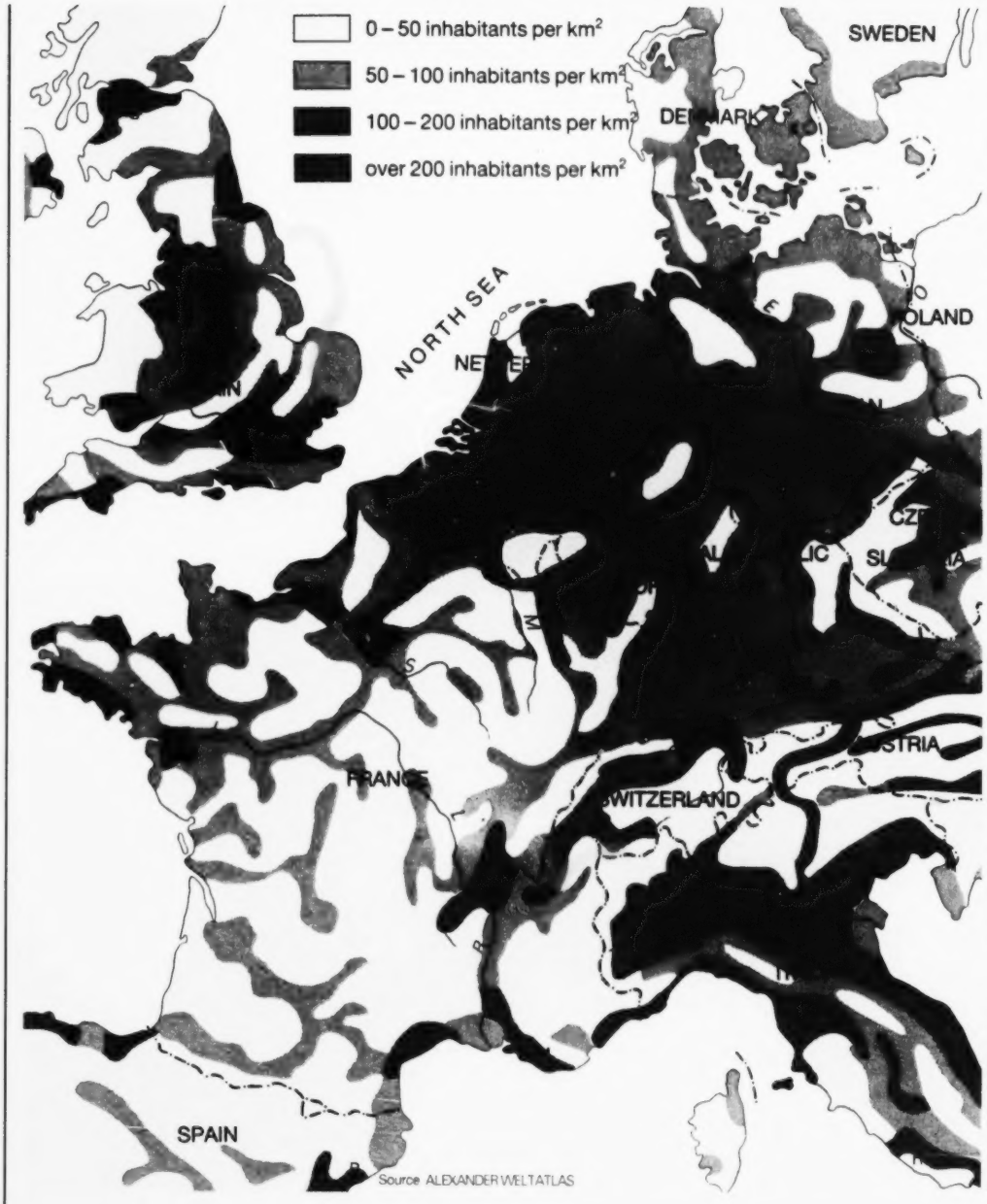
Next to the total number of inhabitants, the age structure of the population is important. The somewhat unbalanced structure of the population pyramid for 1984 reflects the effect of the Second World War on the birth and death rates. The 40-45 age group is rather weakly represented, while the post-war 'bulge' in the birth rate is reflected now in a large group of 35 to 40 year-olds. The decline in births after 1970 is also clearly visible.

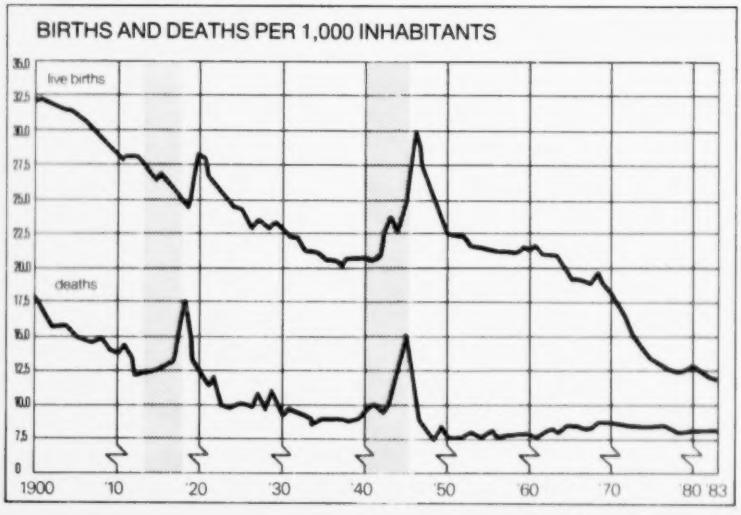
There is also a large group of old people. On 1 January 1984, 11.9% of the population was aged 65 years or over. The average life expectancy at birth has increased from around 37 years in 1850 (high infant mortality) to nearly 76 years today (nearly 73 years for men and over 79 years for women).

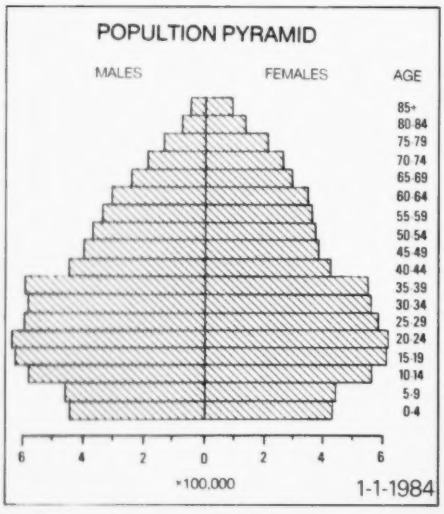
Population density

With an average of 426 inhabitants per square kilometre of land at 1 January 1985 (1), the Netherlands is the most densely populated country in Europe. The map shows that, in this respect, the country forms an entity with other densely populated areas in north-west Europe. Reference has already been made to the country's favourable situation on the North Sea and at the mouth of major rivers. By making use of the possibilities afforded by this situation for trade and industry, the Netherlands, in spite of its the high population density, enjoys a high level of prosperity.

(1) This calculation is bases on the true land area, i.e. excluding waters wider than 6 metres. This area totals 33,935 km^2. If the area incorporated into municipalities (37,291 km^2) is taken as a basis, the density is 388 per km^2. If the total area – including estuaries, territorial waters etc., amounting to 41,473 km^2,– is taken, the population density is 349 per km^2.


0 – 50 inhabitants per km²
50 – 100 inhabitants per km²
100 – 200 inhabitants per km²
over 200 inhabitants per km²
SWEDEN
DENMARK
NORTH SEA
POLAND
FRANCE
SWITZERLAND
AUSTRIA
SPAIN
Source ALEXANDER WELTATLAS
■ = 10 persons per km²
NETHERLANDS
14,3 million inhabitants
JAPAN
118 million inhabitants
INDIA
711 million inhabitants
EGYPT
45 million inhabitants
UNITED STATES
232 million inhabitants
BRAZIL
127 million inhabitants
Source UNO
1982


BIRTHS AND DEATHS PER 1,000 INHABITANTS
live births
deaths
35.0
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
0
1900
'10
'20
'30
'40
'50
'60
'70
'80
'83


POPULTION PYRAMID
MALES
FEMALES
AGE
85+
80-84
75-79
70-74
65-69
60-64
55-59
50-54
45-49
40-44
35-39
30-34
25-29
20-24
15-19
10-14
5-9
0-4
6
4
2
0
2
4
6
×100.000
1-1-1984

Population distribution

Regional distribution

The Dutch population is not evenly distributed over the country. On the page opposite it will be seen (top right) that nearly a half of the total population lives in the three western provinces, while the remaining eight provinces, which cover 79% of the country's area, house only a little more than half of the population. The most densely populated province is South Holland, with 1,080 inhabitants per km^2 of land, and the most thinly populated is Drenthe, with 161 per km^2 (1 January 1984).

It is not the regional differences in *rate of natural increase* which are the cause of this uneven distribution, but much more the greatly varying economic potential of the regions and the *migration flows* to which they give rise. The western provinces, situated on the sea and rivers, have traditionally afforded the best opportunities for successful economic development. For many years during the 19th and the first half of the 20th century the consequence of this was an internal migration flow from the agricultural areas in the rest of the Netherlands directed towards the rapidly growing ports and industrial cities of the west.

Changed migration pattern

The map at the bottom left on the opposite page shows that the migration pattern described above still held during the 1950s. Particularly in the northern provinces there was a net migration loss. The migration gain in the west was compensated for by high emigration overseas (see p. 18).

The adjoining map shows a picture for the second half of the 1970s which is completely opposite in almost every respect. The north and the southwest have a small internal migration gain and the eastern and southern provinces a very large one, while the west has become an area of internal migration loss. The latter is again redressed by foreign immigration, which now, particularly in the west, shows a considerable gain (see p. 18).

The explanation for these drastic changes, although complex, is to be found largely in the following factors. The migration from the west to the north and elsewhere is partly the consequence of the government's dispersal policy. The migration from the west to the southern and eastern regions of the country can largely be seen as an expansion of the Randstad (see also p. 22). The transformation of the South West Netherlands from an emigration to an immigration region is mainly the consequence of better accessibility resulting from the execution of the Delta Project (growth in industry and tourism; see pp. 14-15). The considerable foreign immigration has already been discussed in the preceding section. The picture for the early 1980s does not differ greatly from that for the period 1975-79 except that the *volume* of the migration flows, and particularly of internal migration, has decreased markedly and that the southern provinces now show a modest net migration loss. This reversal in the southern provinces of North Brabant and Limburg, which still enjoyed a considerable net migration gain during the 1970s, is partly the result of the loss of manufacturing jobs in those areas.

Urbanisation and suburbanisation

The pattern of internal migration up to about 1960 had largely the character of a movement to the cities. As the population grew and, at the same time, agriculture became increasingly mechanised, people left the countryside to find a livelihood in the towns. At first it was mainly the large cities in the west which grew as a result of this, but later the medium-sized towns in the east and south were affected as well.

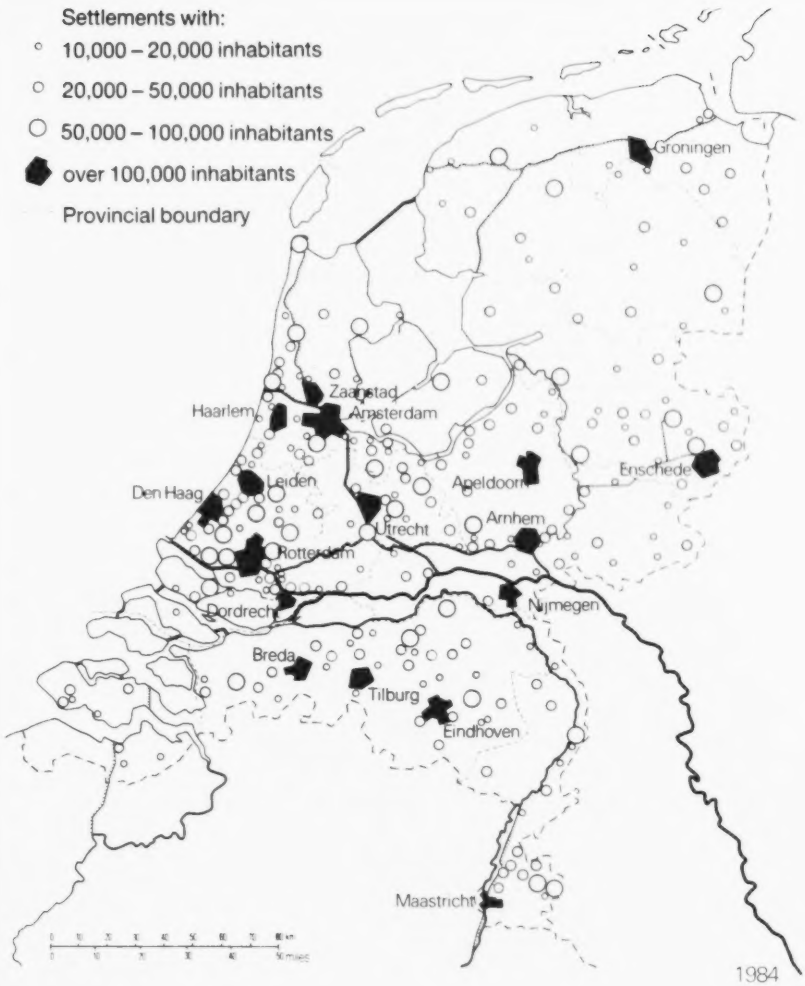
After 1960 important changes occurred. In the town centres many dwellings were demolished to make way for shops, offices and roads. The density of new development was generally lower than that of the old and the average dwelling occupancy also fell. As a result, the population of the large cities and, after a while, of their agglomerations, began to fall. Many people left the cities and settled in smaller places, attracted by a better residential environment and enabled to do so by their greatly increased mobility. They generally continued to work in the city, so that suburbanisation brought with it a great increase in commuting. At the beginning of the 1980s the trend began to reverse. The volume of suburbanisation decreased and people were again encouraged to live in the cities by such measures as the carrying out of numerous urban renewal projects in old residential areas, the building of homes round old dock basins and on old factory and barrack sites.

	land area in km^2*	population x 1,000 1 Jan 85	pop. per km^2 of land 1 Jan 85	% growth 1 Jan 80 to 1 Jan 85
Groningen	2,335	561.1	240	1.3
Friesland	3,336	597.6	179	2.3
Drenthe	2,654	429.5	162	2.6
NORTH NETHERLANDS	**8,324**	**1588.2**	**191**	**2.1**
Overijssel	3,811	1044.9	274	2.6
Gelderland	5,006	1745.3	349	3.0
S. IJsselmeer Polders***	974	121.2	124	85.0
EASTERN NETHERLANDS	**9,791**	**2911.4**	**297**	**4.8**
Utrecht	1,332	936.1	703	4.5
North Holland	2,668	2311.5	866	0.2
South Holland	2,907	3151.3	1084	2.2
WESTERN NETHERLANDS	**6,907**	**6399.0**	**826**	**1.8**
Zeeland	1,785	355.4	199	2.0
SOUTH WEST NETHERLANDS	**1,785**	**355.4**	**199**	**2.0**
North Brabant	4,957	2113.0	426	3.0
Limburg	2,170	1085.7	500	1.6
SOUTH NETHERLAND	**7,127**	**3198.6**	**449**	**2.5**
NETHERLANDS**	**33,935**	**14453.8**	**426**	**2.6**

* area excl. waters wider than 6 metres

** population of the Netherlands including people with no fixed address entered in the Central Population Register

*** includes the municipalities of Almere, Dronten, Lelystad and Zeewolde, which had not been allocated to a province, and the 'Southern IJsselmeer Polders Authority'.



Distribution of area and population between the western and remaining provinces.
1-1-1984

Area

NORTH HOLLAND UTRECHT SOUTH HOLLAND	FRIESLAND GRONINGEN DRENTE OVERIJSSEL GELDERLAND ZEELAND NORTH-BRABANT LIMBURG
21%	79%

Population

NORTH-HOLLAND UTRECHT SOUTH-HOLLAND	FRIESLAND GRONINGEN DRENTE OVERIJSSEL GELDERLAND ZEELAND NORTH-BRABANT LIMBURG
44%	56%

Internal and overseas migration of the population

The Randstad

Origin and characteristics

The Randstad is a concept which was introduced in the 1930s to indicate the cluster of cities in the western Netherlands. The concept has no official basis, however. There is no precise definition of the boundaries of the Randstad and, consequently, no generally accepted figures for its area and population.

When the sea level rose after the Ice Age the major part of the area of what is now the Randstad was transformed into a marshy lagoon, so that towns developed late here, generally not until during the course of the Middle Ages. The favoured sites were higher places on the edge of the swamps, such as the dunes in the west (e.g. Haarlem, The Hague), the Pleistocene sands in the east (Hilversum) and the levees along the rivers (Amsterdam, Rotterdam, Utrecht, Leiden). This explains in broad outline the structure of an annular belt of towns around a more open central zone – the 'Green Heart'. In recent years, the name 'Randstad' has come to be used increasingly for the whole area of cities, 'Green Heart' and fringe areas combined.

The two maps show how, during the course of more than a century, the towns and villages of the Randstad have grown towards each other. The cities have nevertheless retained their own identities, both in respect of their physical pattern and of their function, character and the way they are experienced by their inhabitants.

An essential difference between the Randstad and London or Paris, for example, is that, in the Randstad, the traditional functions such as administration, industry and services are not concentrated in a single centre, but are distributed over a number of cities.

Amsterdam and Rotterdam – each in its own way – owe their origin and growth in part to their special situation. They have long formed points of entry to the European hinterland and have accordingly developed mainly as commercial and industrial centres. The Hague is the national seat of government (although Amsterdam is the country's capital). Utrecht, situated in the centre of the country, forms a node of road and rail communications between the different parts of the Netherlands and derives from this a function as a centre for trade fairs and conferences.

The bar diagram shows that the share of the Randstad in the total population of the country has increased considerably since the last century.

Spatial overpopulation

The Randstad as a whole has at present (1985) some 6 million inhabitants, of whom nearly 4 million live in the urban ring. Until about 1970 the population of the Randstad increased quite fast, but since then the rate of growth has been declining rapidly, mainly because the net loss from internal migration has exceeded the net gain from foreign immigration. The population of the major cities in fact showed a marked decrease during the 1970s. In the four largest cities the decrease was around 15%. The populations of the smaller places in the 'Green Heart' continued to increase during that period, but in recent years the differences have become smaller. The pace of suburbanistion has abated and residence in the large cities is being encouraged (see p. 20).

Many problems in the Randstad stem from the spatial overpopulation in the conurbations. Many towns have to contend with both quantitative and qualitative housing problems. Because of the pronounced fall in the average dwelling occupancy the need for residential space increases even if the population ceases to grow. The marked rise in the number of commuters gives rise to major traffic problems, particularly during the peak hours.

There is also a great lack of recreational space in and around the Randstad: the agricultural polder land of the 'Green Heart' – apart from the lakes – does not lend itself to mass recreation. The damage to the environment from water, air, soil and noise pollution is becoming serious in some areas. Moreover, the 'Green Heart' itself is being threatened by suburbanisation – both through an increase in the number of residents and in activities in the secondary and tertiary sectors – and by the construction of roads, the building of second homes etc. The population density in the 'Green Heart' is already the same as the national average.

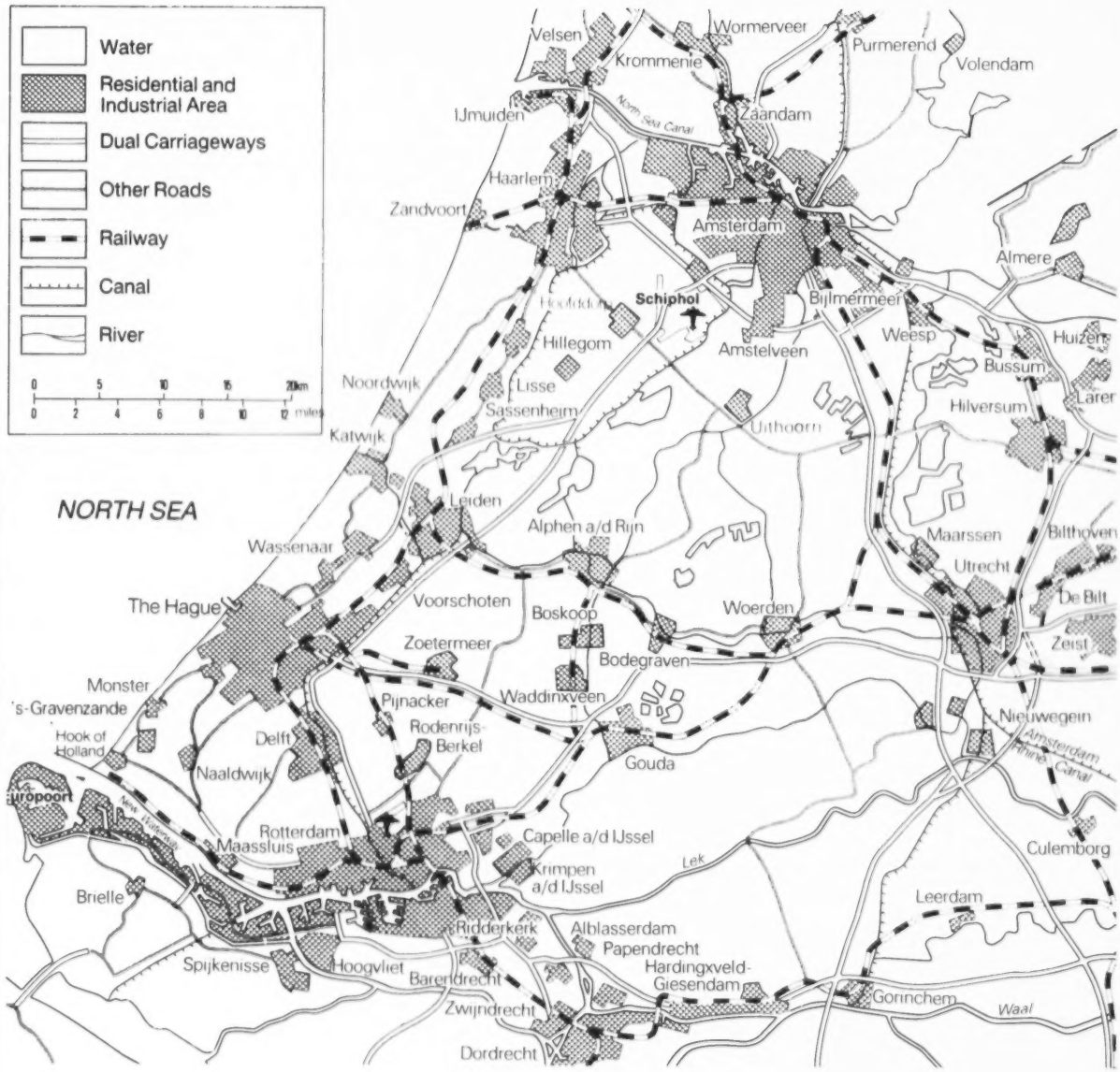
Planning policy

The basis of the policy for the Randstad and its place in town and country planning for the Netherlands as a whole was considerably changed at the beginning of the 1970s. Before then (see Tweede Nota Ruimtelijke Ordening – Second Memorandum on Physical Planning, 1966, p. 38) the first objective was to restrain the growth of the Randstad as far as possible in favour of the North, East and South of the country by means of a national dispersal policy. In order to prevent the separate towns of the Randstad growing together physically and the 'Green Heart' filling up, the population growth had to be accommodated in growth centres which had been mainly projected on the outer side of the Randstad urban ring.

During the 1970s, however (Derde Nota Ruimtelijke Ordening – Third Memorandum on Physical Planning – 1974 *et seq.*), there proved to have been such a large degree of spontaneous migration from the urban ring that the strict dispersal policy was partly abandoned. It was feared that the Randstad would be weakened nationally and internationally if the exploitation of its obvious locational advantages continued to be restrained.

The concern for retaining an open 'Green Heart' has remained, although local concessions have had to be made, as at the growth centre of Zoetermeer east of The Hague, as well as along the eastern rail line between The Hague and Rotterdam and in the Haarlemmermeer, near Schiphol airport.

During the past few years the growth centre policy has been largely abandoned and the search for new building sites is now being concentrated within the existing towns as part of the 'compact city' policy (see also p. 40).


Water
Residential and Industrial Area
Dual Carriageways
Other Roads
Railway
Canal
River
0 5 10 15 20km
0 2 4 6 8 10 12 miles
NORTH SEA
Velsen
Wormerveer
Krommenie
Purmerend
Volendam
IJmuiden
North Sea Canal
Zaandam
Haarlem
Zandvoort
Amsterdam
Almere
Schiphol
Bijlmermeer
Hillegom
Amstelveen
Weesp
Huizen
Bussum
Noordwijk
Lisse
Sassenheim
Hilversum
Larer
Katwijk
Uithoorn
Leiden
Alphen a/d Rijn
Maarssen
Bilthoven
Wassenaar
Utrecht
The Hague
Voorschoten
Boskoop
Woerden
De Bilt
Zoetermeer
Zeist
Bodegraven
Monster
's-Gravenzande
Pijnacker
Waddinxveen
Nieuwegein
Hook of Holland
Rodenrijs
Berkel
Delft
Amsterdam Rhine Canal
Naaldwijk
Gouda
Europoort
New Waterway
Rotterdam
Capelle a/d IJssel
Culemborg
Maassluis
Krimpen a/d IJssel
Lek
Brielle
Leerdam
Ridderkerk
Alblasserdam
Papendrecht
Spijkenisse
Hoogvliet
Barendrecht
Hardingxveld-Giesendam
Zwijndrecht
Gorinchem
Waal
Dordrecht
1850
Built-up Area
Randstad in 1975
A
H
U
R
1984
Built-Up Area
Randstad
A
H
U
R
0 0,75 3
POPULATION IN MILLIONS
RANDSTAD
REMAINDER OF THE NETHERLANDS
0
6,0
14,4

Amsterdam and Rotterdam

History

In broad outline, many parallels may be observed in the historical development of the cities of Amsterdam and Rotterdam. Both cities grew up at sites where, in the Middle Ages, a dam was constructed in a small river (the Amstel and the Rotte) in order to reduce the danger of flooding. They subsequently developed into the two largest port cities of the Netherlands in the Golden Age. In about 1650, Rotterdam had some 50,000 inhabitants, while Amsterdam had over three times as many.

Urban pattern

The adjoining maps show for each city, the historic city centre, the districts built in the 19th and early 20th century, those built between the wars and, lastly, the areas dating from after 1945.

Particularly since the Second World War the centre of the two cities have become completely different in character. Amsterdam is famous for its rings of 17th century canals, its countless bridges and old merchants' houses. The historic centre of Rotterdam was not rebuilt in the old style after the bombing of 1940. There arose instead a modern, large-scale business and entertainment centre, crossed by wide traffic streets and spacious pedestrian promenades. The residential function was greatly reduced. In the centre today there are over 6,500 dwellings, which is only 26% of the pre-war total of about 25,000.

The preservation of the valuable historical character of the centre of Amsterdam demands great efforts. Nearly 7,000 premises have been designated as 'monument', the restoration of which requires large sums of money. The historic centre is completely unsuited to modern traffic, so that accessibility, particularly by car, is a great problem for the many shops and offices. Many businesses have therefore moved out to the edge of the city or to fringe municipalities such as Amstelveen and the Haarlemmermeer. In the latter municipality, the airport of Schiphol, in particular, exerts a strong attraction. More than 400 firms are established there, providing employment for 27,500 people (late 1983).

Many of the inhabitants of Rotterdam find the large-scale character of the rebuilt centre rather unattractive. By creating residential areas wherever possible and by planting trees, laying out cafe terraces, building small shops etc., it is hoped to create something more congenial.

The 19th century districts surrounding the centres were put up rapidly at the time of the industrial revolution in these and other cities and the problems are comparable. Bad living conditions necessitate radical improvements which have been too long delayed by economic depressions and world wars. After the war there was an initial inclination to clear these neighbourhoods completely and replace them with new development, partly of dwellings, partly of offices, shops, recreational facilities and traffic infrastructure. After some years a more differentiated approach was evolved: only the worst properties were completely replaced (reconstruction), while the rest were subject to 'renewal' i.e. improvement of the existing premises.

In both cities dwellings are now being built on smaller open sites in the central area. This is happening, for example, around old dock basins which have lost their original function because of the seaward shift of port activities. Old warehouses are also being transformed into living accommodations.

Even before the Second World War and especially in the years which followed, there arose a great need in both cities for land for residential expansion. The reasons for this were the growth in population, the replacement of destroyed or demolished dwellings and the fall both in the average dwelling occupancy and of the average number of dwellings per hectare. In both cities space was found in the remaining territory of the municipality, enlarged, particularly in Rotterdam, by the annexation of fringe municipalities. Further growth took place in smaller places in the vicinity, which developed greatly as commuter settlements. Both cities also developed a satellite town: Hoogvliet, southwest of Rotterdam, and the Bijlmermeer, southeast of Amsterdam.

The high-rise development which has been much used in these and other new neighbourhoods does not meet the housing desires of the majority of the population. Families with young children, in particular, prefer single family houses with gardens. These are usually available only in more remote small settlements, which are becoming suburbanised (cf. p. 22).

The figures in the table show how the populations of the municipality and the agglomeration have declined in both Rotterdam and Amsterdam.

Population	1 January	Amsterdam	Rotterdam
Municipality	1969	845,821	699,245
	1982	700,759	568,167
Agglomeration	1969	1,046,063	1,059,646
	1982	945,062	1,025,580

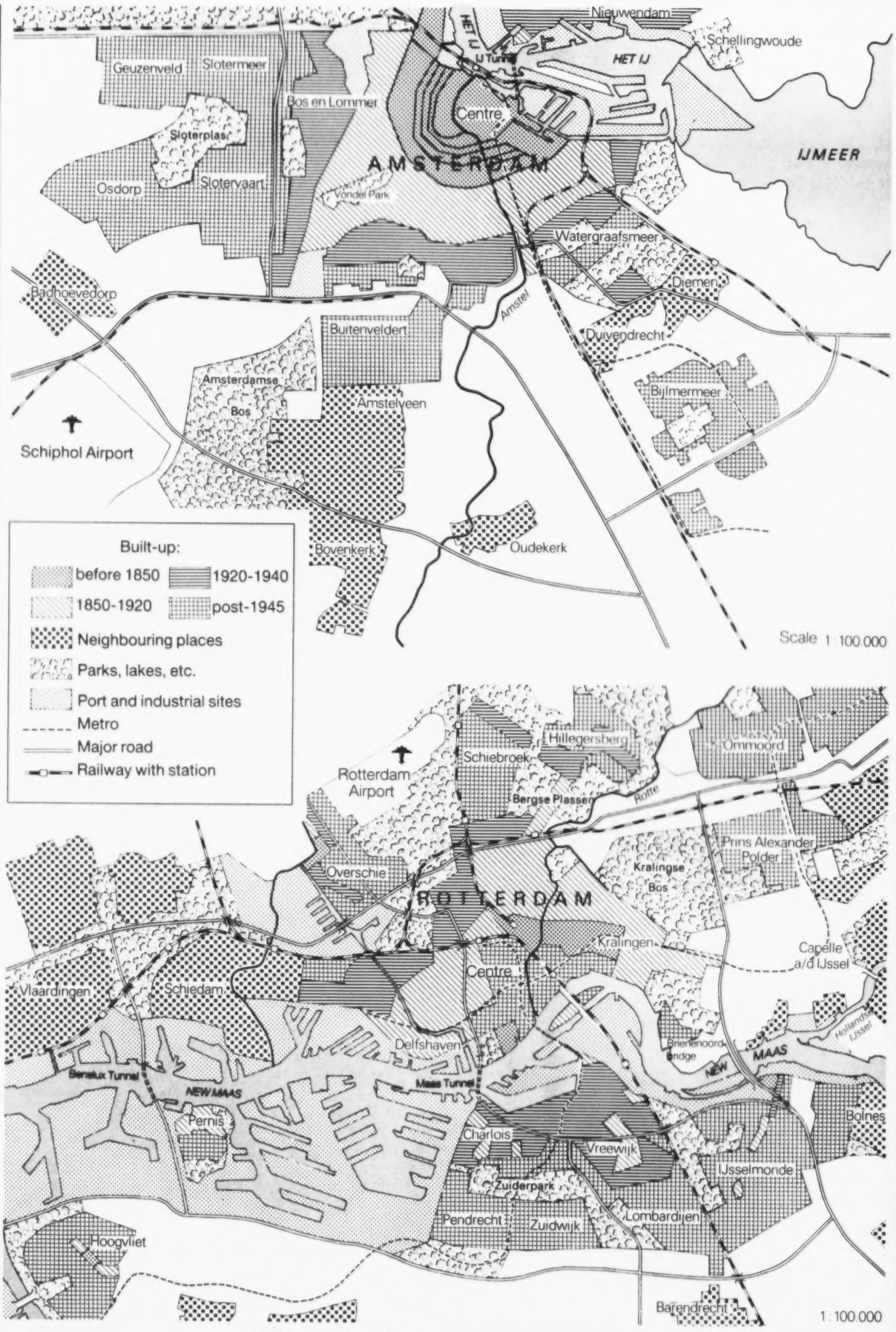
Traffic

In both cities the aim is to keep through road traffic out of the central area as far as possible. For this purpose an extremely costly 'diamond' of motorways was completed in Rotterdam in 1975. It is hoped to complete a similar road system around Amsterdam by 1990.

To encourage the use of public transport, a modest start has been made in both cities with the construction of 'metro' lines. In Rotterdam a north-south line has linked the centre on the right bank of the Maas since 1968 with the southern part of the city and with the satellite town of Hoogvliet. In addition, the first section of an east-west link was completed on the right bank in 1982. In Amsterdam a metro line has been operating between the centre and the last great extension of Amsterdam-South East (incl. the Bijlmermeer) since 1977.

In both cities these lines run underground only through the city centre and special techniques had to be developed to build them through the swampy and soft layers of peat and clay.

Moreover, during the past few years a number of new stations have been opened on the fringes of both cities along the existing lines of the national rail network.


Nieuwendam
Schellingwoude
HET IJ
IJ Tunnel
Geuzenveld
Slotermeer
Bos en Lommer
Centre
Sloterplas
AMSTERDAM
IJMEER
Osdorp
Slotervaart
Vondel Park
Watergraafsmeer
Diemen
Badhoevedorp
Amstel
Buitenveldert
Duivendrecht
Amsterdamse Bos
Amstelveen
Bijlmermeer
Schiphol Airport
Bovenkerk
Oudekerk
Scale 1:100 000
Built-up:
before 1850
1850-1920
1920-1940
post-1945
Neighbouring places
Parks, lakes, etc.
Port and industrial sites
Metro
Major road
Railway with station
Rotterdam Airport
Schiebroek
Hillegersberg
Ommoord
Bergse Plassen
Rotte
Prins Alexander Polder
Overschie
Kralingse Bos
ROTTERDAM
Kralingen
Capelle a/d IJssel
Centre
Vlaardingen
Schiedam
Delfshaven
Brienenoord Bridge
Holland's IJssel
MAAS
NEW
Benelux Tunnel
NEW MAAS
Maas Tunnel
Pernis
Charlois
Vreewijk
Bolnes
IJsselmonde
Zuiderpark
Pendrecht
Zuidwijk
Lombardijen
Hoogvliet
Barendrecht
1:100 000

26

The Economy

International character
The economy of the Netherlands has long had a strong international orientation. In this connection, reference has already been made in the introduction to this booklet to the importance of the country's favourable situation in relation to communications. Fisheries and shipping stimulated the rise of foreign commerce and industry.

During the past hundred years a further factor has come to play an increasingly important part. The country has become progressively more densely populated and is, moreover, relatively poor in natural resources. The logical consequence of this has been a great rise in the volume of imports. To ensure a favourable balance of payments, therefore, a large export of goods and services is equally important. Until about 1970 it was never possible to cover the value of the imported goods with that of the exports. Attempts were made with varying success to maintain a stable balance of payments by means of a surplus on the services account (invisible exports). From 1970 the balance was positively influenced by the voluminous export of natural gas. The dependence on foreign trade predisposes the Netherlands in favour of international economic cooperation, as in Benelux and the EEC, although the disadvantages of this are also clearly felt, as in the intensified foreign competition.

Working population and employment
The distribution of the working population over the different sectors of the economy has changed since 1900 in a way which is characteristic of all the industrialised countries. Certain clear stages may be distinguished, as appears from the pie charts on the oppasite page:

1. In 1900, the agricultural, manufacturing and services sectors each comprised about one third of the working population.
2. In 1960, the proportion working in the agricultural sector had greatly declined and that working in the manufacturing greatly increased (cf. also the absolute figures plotted in the bar charts). The numbers employed in other sectors – mainly the services sector – had greatly increased.
3. In 1983 the decline in the agricultural sector was found to have progressed still further. Economies of scale, mechanisation and loss of agricultural land to other uses were largely responsible.

A striking feature is that the relative and absolute numbers of those working in the manufacturing sector have now also suffered a marked decline. Different factors play a part here, such as difficulties in selling goods at home and abroad, continuing mechanisation and automation, saturation of particular market sectors and the stagnation of the economy since 1973. The shift of emphasis to the services sector is clearly shown.

During the 1970s and the early 1980s the rate of unemployment increased and reached 17.5% in 1984. This is the result not only of the temporary stagnation in the economy; there is also a considerable measure of structural unemployment, arising, for example, from the processes of automation and economies of scale referred to above. These have led to an impressive rise in labour productivity, but employment has been reduced. Attempts are now being made through such radical measures as the introduction of a shorter working week to reduce structural unemployment.

Regional differences
In order to remove undesirable regional differences in employment and income structure etc., the government has been pursuing a socio-economic dispersal policy since the 1950s. Initially, one of the principal aims was to improve the infrastructure and standard of education in areas which had a high rate of unemployment relative to the national average. Firms received subsidies for the number of jobs created. Financial compensation was also paid to people who left such areas. The latter measure was quickly abandoned when the pressure on the western coastal provinces was found to be assuming unacceptable forms, while the migration from the less prosperous areas was proving to be undesirably selective, leading, for example, to ageing of the population.

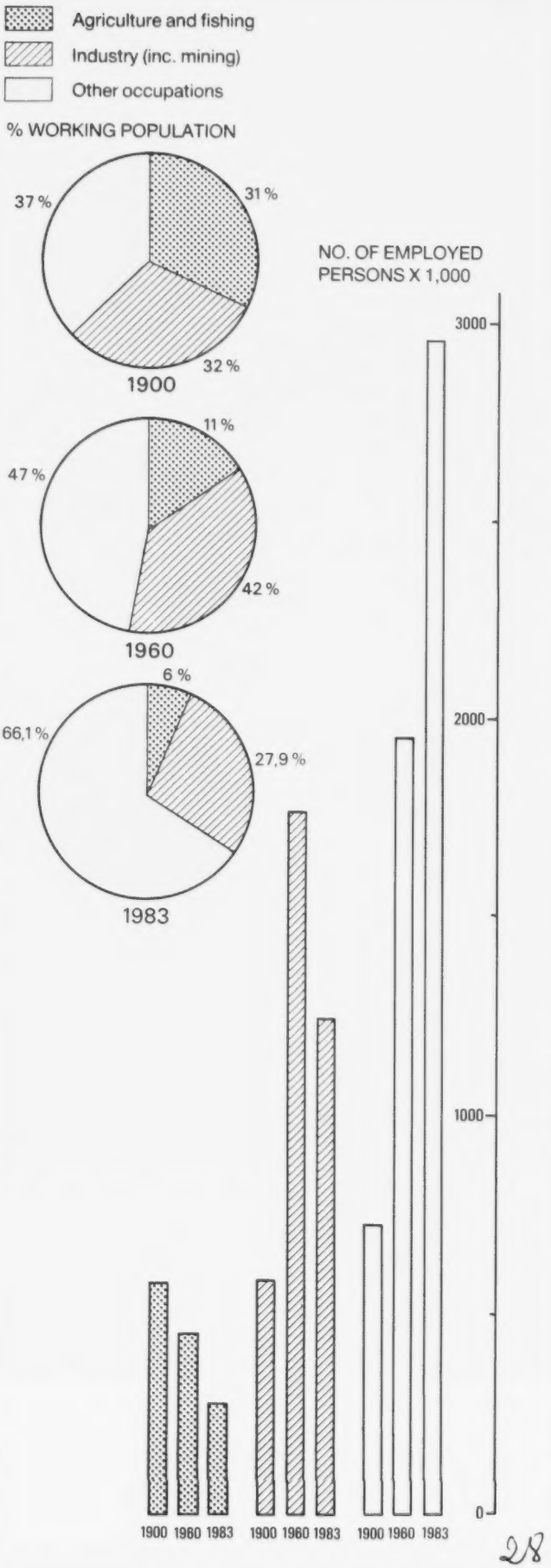
In 1958, four 'problem regions' were designated (see map, top right), characterised by a decline in agricultural employment and an absence of alternative sources of work. In these regions, the establishment of firms, particularly in the manufacturing sector, was encouraged by means of financial and other incentives.

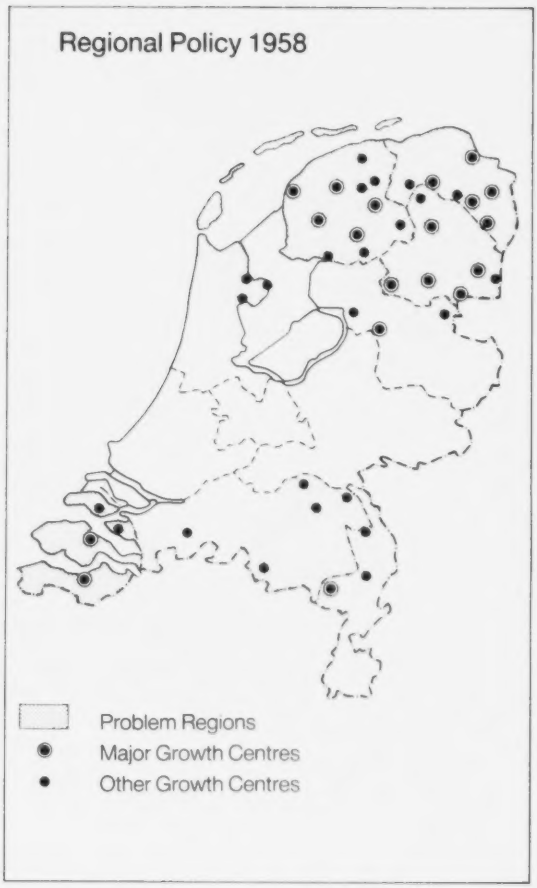
Since then, the policy has undergone a number of radical changes (see map, bottom right). It has been found possible to remove a number of areas from the list, such as Zeeland, which is now better served by roads. The three northern provinces remain an area where various measures are in force to stimulate the economy. Besides this 'development area', South Limburg was designated as a 'restructuralisation area' where measures had to be taken to compensate for the consequences of closing all the coal mines within a short space of time (see p. 30).

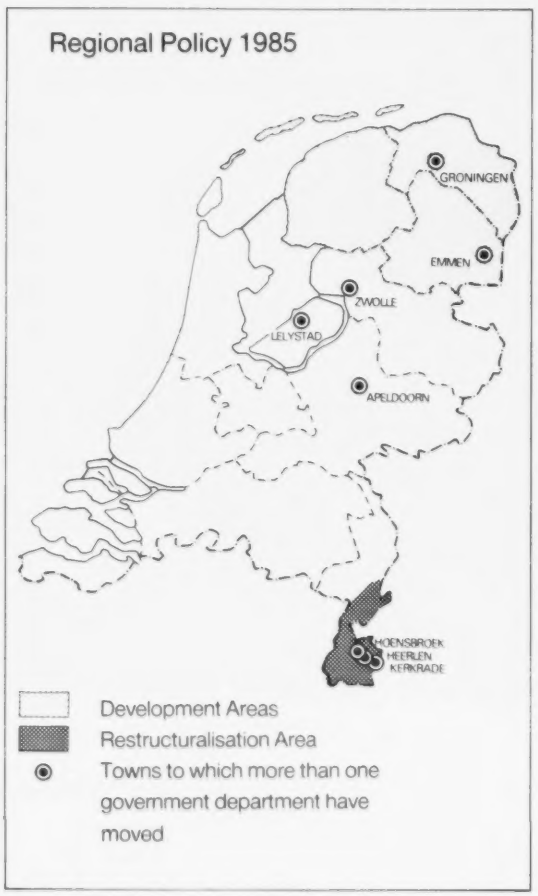
In addition, the province of Utrecht and large parts of the provinces of North and South Holland and Gelderland (the Veluwe) were designated as an area for the enforcement of a policy of restraint. Here there was a need to be able to prevent the establishment of new industries because of lack of space or the damage they would cause to the environment. Because of the stagnation in the economy the restraint policy was in force only from 1975 to 1983.

Viewing the problem as a whole, there has been a fundamental reversal of policy during the last few years. No longer is support given in the first place to problem areas or to whole branches of industry which find themselves in difficulties (textiles, shipbuilding), but there is selective support of enterprises and industries which appear to have a future. This support also extends to firms in the Randstad. In the development and restructuralisation areas incentives are now also being given to service activities, with the government setting an example with the relocation of a number of its own departments.

In 1972 an ambitious plan was drawn up to move government departments employing a total of 6,500 civil servants from The Hague to such places as Zwolle, Groningen, Emmen and Leeuwarden in the north and Heerlen in the south. (Such transfers had already taken place in the 1960s, although over shorter distances, such as to Arnhem and Apeldoorn in the east.) This trend has stagnated in the past few years, however, because of the high costs, the objections of many civil servants to compulsory removal and the protests of the municipality of The Hague and the province of South Holland. The latter point out that unemployment has also risen rapidly in the region of The Hague in recent years. It was decided in 1985 that no more transfers of government departments would take place. The last major transfer will be that of the Headquarters of the Post Office from The Hague to Groningen in 1986.


Agriculture and fishing
Industry (inc. mining)
Other occupations
% WORKING POPULATION
37 %
31 %
32 %
1900
11 %
47 %
42 %
1960
6 %
66,1 %
27,9 %
1983
NO. OF EMPLOYED PERSONS X 1,000
3000
2000
1000
0
1900 1960 1983 1900 1960 1983 1900 1960 1983


Regional Policy 1958
Problem Regions
Major Growth Centres
Other Growth Centres


Regional Policy 1985
GRONINGEN
EMMEN
ZWOLLE
LELYSTAD
APELDOORN
HOENSBROEK
HEERLEN
KERKRADE
Development Areas
Restructuralisation Area
Towns to which more than one government department have moved

28

Agriculture

Land use
As the bar chart shows, nearly two thirds of the area of the Netherlands consists of cultivated land and the greater part of this is grassland. Woods and nature areas together account for a little over 13% of the Dutch land area. Both the cultivated and the wild areas are constantly decreasing in extent because of the building of roads and the expansion of towns and industrial sites. This loss has been partly compensated for by land reclamation, mainly in the IJsselmeer polders.

Agricultural regions
The map shows the regional distribution of the different forms of agricultural land use. The regional diversity can be explained mainly by reference to such factors as nature of the soil and the water economy.

Arable farming is found mainly on fertile, well-drained marine clays, such as occur in the north and south-west Netherlands, in the drained lakes of North and South Holland, and in the IJsselmeer polders. The most important crops grown are cereals, potatoes and sugar beet. The farms are quite large by Dutch standards (average 40 ha) and highly mechanised. The production of bread grains is not sufficient for home consumption, about 80% of which consists of imported wheat. Arable farming also predominates in the 'peat colonies' of south east Groningen and east Drenthe, where industrial potatoes and sugar beet are grown.

Livestock farming occurs mainly on the less well-drained clay and peat soils, where the ground is mostly too soggy for arable farming. Here cattle farming predominates, with milk (for home consumption) and dairy products (partly for export) as the main products. Mixed farms are traditional on the sandy soils of the eastern and southern Netherlands, although the emphasis is being placed increasingly on livestock farming. Many small farms have begun to specialise in intensive pig and poultry farming (factory farming). In addition, many livestock farmers have started growing green maize on part of their land as a fodder crop. Since increasing use is being made of mixed feeds in all the livestock areas, this has given rise to the large-scale manufacture of these products.

Horticulture is practised in many areas. Its regional distribution is explained by both physical and economic factors (domestic and foreign markets). Behind the dunes south of Haarlem are the famous bulbfields. Along the rivers there are many orchards (the Betuwe). In other areas shown on the map many kinds of vegetables, fruit, flowers and plants are produced. Salad crops – tomatoes, cucumbers and lettuces – are particularly important and a high proportion of them are grown in heated glasshouses, mainly in the Westland, south of The Hague. Many horticultural products are exported, with fruit and vegetables being sold, for example, to the Rhine-Ruhr region of Germany.

During the past few years there has been a rapid growth in the cultivation of cut flowers and pot plants under glass. There are now already more flowers and pot plant growers than producers of fruit and vegetables in the Westland. The flowers and plants are exported not only to countries in Europe, but also in rapidly increasing quantities to North America.

The importance of agriculture
The role played by agriculture in the Dutch economy has greatly changed during the past century. When Dutch agriculture was confronted at the end of the 19th century with the import of cheap agricultural products from overseas, such as grain from North America, a process of adjustment set in, which is, in fact still continuing. The process involves the reduction or abandonment of the growing of crops which can be produced more cheaply abroad and specialisation in high-value products, which can also be exported. The result is that some 20 to 25% of the Dutch export trade now consists of processed or unprocessed agricultural products, the value of which greatly exceeds that of agricultural imports. Associated with this, there has been a continuing effort to increase yields, both per hectare and per worker. The many land consolidation schemes, which have been or are being carried out throughout the country, must also be viewed in this light. Their effect is to increase the size of holdings and parcels and to reduce the numbers of people employed in farming (see table). Moreover, the number of parcels per holding is reduced and the accessibility of the parcels is improved. The aim is to achieve savings in costs through efficient farming practice. This is the only way in which Dutch agriculture can continue to play an important role, both in the EEC and in other contexts.

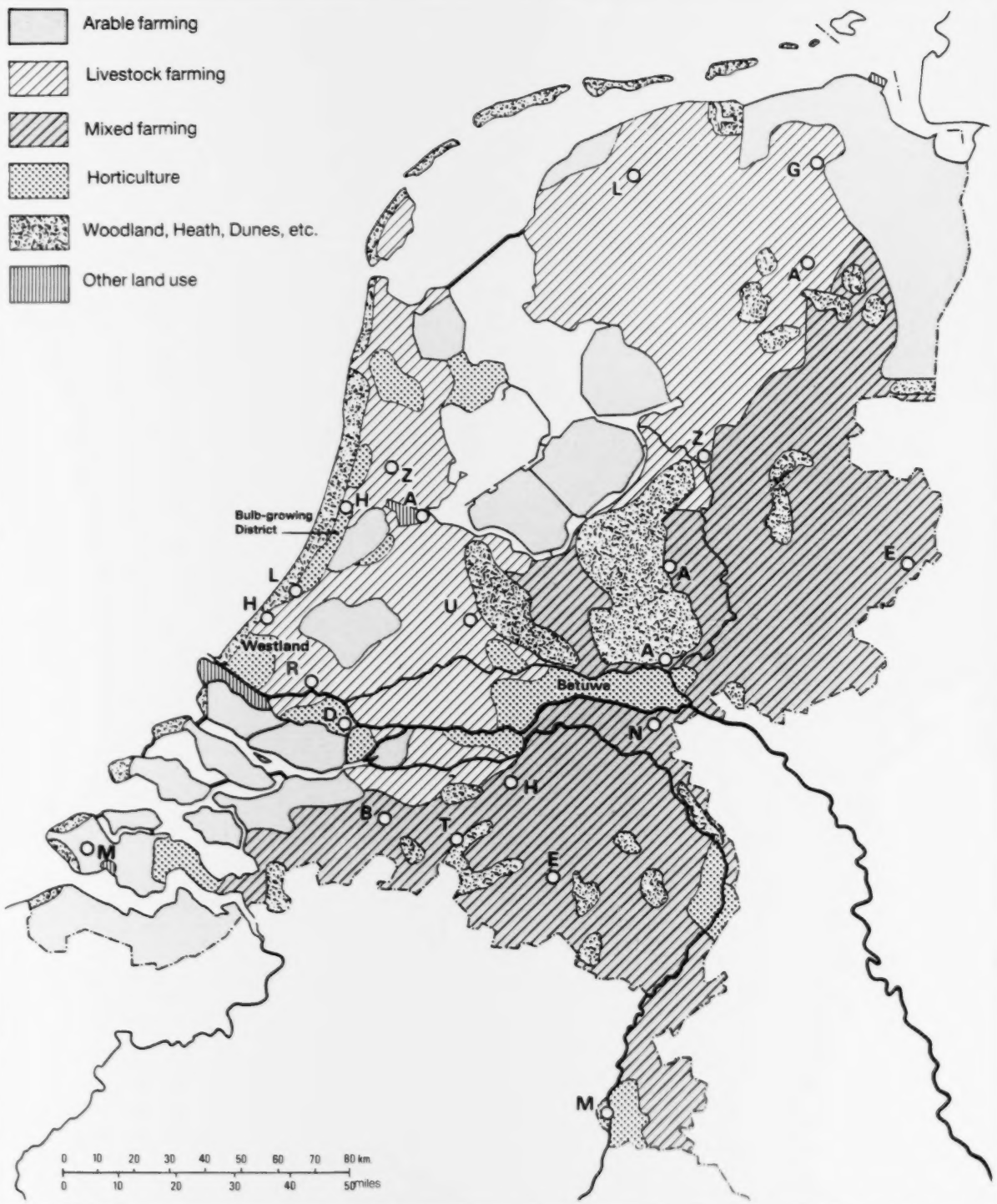
Statistics of land use, persons employed and productivity

The figures in the table illustrate the trends just described, such as specialisation (increasing relative importance of horticulture), increased productivity and reduction in the number of persons employed in agriculture, both relatively and absolutely.

Organisation
The Netherlands has a great variety of agricultural and horticultural organisations which promote the interests of their members in many ways. They encourage, for example, the establishment of agricultural and horticultural cooperatives, of which there are over a thousand. The cooperatives concern themselves with such matters as the advancement of credit, the joint purchase of raw materials, machinery etc., with the industrial processing of agricultural products and with marketing. In the latter connection, the cooperative auctions, such as the world's largest flower auction at Aalsmeer, near Amsterdam, are well known.

In addition to the work of the cooperatives, the high standard of Dutch agriculture and horticulture can be related, in particular, to a broadly-based system of agricultural education, intensive agricultural research and a well-organised agricultural advisory service.

Land use	**1970**	**1975**	**1984**
Cultivated land (x 1,000 ha)	2143	2082	2016
of which (in %)			
– arable land	32	32	36
– grassland	62	62	58
– horticulture	5.5	5.5	5.9
– fallow	0.4	0.4	0.2
Employed population	**1971**	**1975**	**1984**
No of person employed in agriculture (x 1,000)	339	311	271
idem, as % of total working population	7	6.2	4.6
Productivity	**1970**	**1975**	**1984**
Liquid milk (kg per cow)	4390	4650	5230
	1971-75	**1976-80**	**1981-84**
Winter wheat (tonnes per ha)	52	61	74
Sugar beet	46	47	53



LAND USE IN THE NETHERLANDS (excluding water)

ARABLE LAND 20%	HORTICULTURE 3,4%	PASTURE 34,8%	WOODS, HEATHS, DUNES, ETC 13,3%	BUILDINGS, ROADS, ETC. 28,3%

1983

Mineral production

History
Until late in the 19th century it was thought that the subsoil of the Netherlands was poor in minerals, although it was already known that South Limburg was underlain by coal and marl, but the State and private enterprise showed little interest in exploitation in this remote and, at that time, inaccessible part of the country.

Coal
Around the turn of the century, when the need for industrialisation became evident, there was growing interest in the coal reserves and exploitation began with the sinking of twelve mines, at first with private and, later, with state capital. Both industrial and domestic coals were mined at depths down to 1,000 metres. After 1960, the year in which great reserves of natural gas were discovered beneath the Netherlands, coal mining proved to be no longer economic and, between 1966 and 1975, exploitation ceased in all the mines (see further pp. 34-35).

The coal which is still needed, such as that for blast furnaces, is now imported. The table below, giving the total Dutch energy consumption in percentages, shows how coal has been ousted by natural gas, which can be produced and transported much more cheaply, is more economical to use and causes less air pollution (see also the bar chart).

Energy consumption in %	1963	1983
Coal	44	9
Natural gas	2	50
Petroleum	54	36
Nuclear energy	0	4

Natural gas
In 1960 one of the largest gasfields in the world was discovered under the North Netherlands. The gas was formed through the carbonisation of peat layers dating from the Carboniferous period and was trapped through being sealed off by the overlying salt layers. The gas has accumulated in Permian strata at a depth of about 3,000 metres.

The largest field is situated in the province of Groningen, near the small village of Slochteren. In that field alone there are already about 300 wells. Natural gas has previously been found at other places in the Netherlands, where it was associated with the occurrence of oil. Gas reserves were later also found under the Waddenzee and North Sea (as well as petroleum).

Exploration was greatly intensified after the energy crisis of 1973-74. Under the Geneva Convention of 1958, the Netherlands was allocated a block of the continental shelf of the North Sea which is larger than the country itself: 57,000 km^2. Gas production from the North Sea already supplied 12% of total domestic consumption in 1983 and this proportion is expected to rise still further.

Purchase, transport and sale of the gas are in the hands of the *Nederlandse Gasunie*, a limited company in which shares are held by DSM (Dutch State Mines), ESSO, Shell and the Dutch state.

During the 1960s a pipeline network with a total length of over 10,000 km was laid over the whole country and was extended beyond its borders, so that Dutch natural gas is now also used in the Federal Republic of Germany, Belgium, France, Switzerland and Italy.

The volume of gas disposed of by the Gasunie increased constantly from the establishment of the concern in 1963 to reach a peak in 1976. Sales at home and abroad were 94.5 billion cubic metres at that time. After the oil crisis of 1973 and 1974 the official policy was to restrain gas consumption in order to maintain natural gas supplies in the Netherlands for as long as possible. Added to the effect of the international economic recession, this resulted in a reduction in sales to 70.8 billion cubic metres in 1982. The annual turnover of the Gasunie has fluctuated around this figure since then.

Somewhat less than half of the total gas production is exported. At home, natural gas is used in nearly every household. It is also the primary raw material for industry and electricity power stations. Some of these power stations, which had converted to natural gas during the 1960s, have been reconverted to burning coal.

Attempts were originally made also to restrict exports to what had already been contracted, i.e. a total of about 950 billion cubic metres, but, in view of the estimated and proved reserves, efforts are again being made to achieve a modest increase in natural gas exports. The proved reserves now exceed 1900 billion cubic metres.

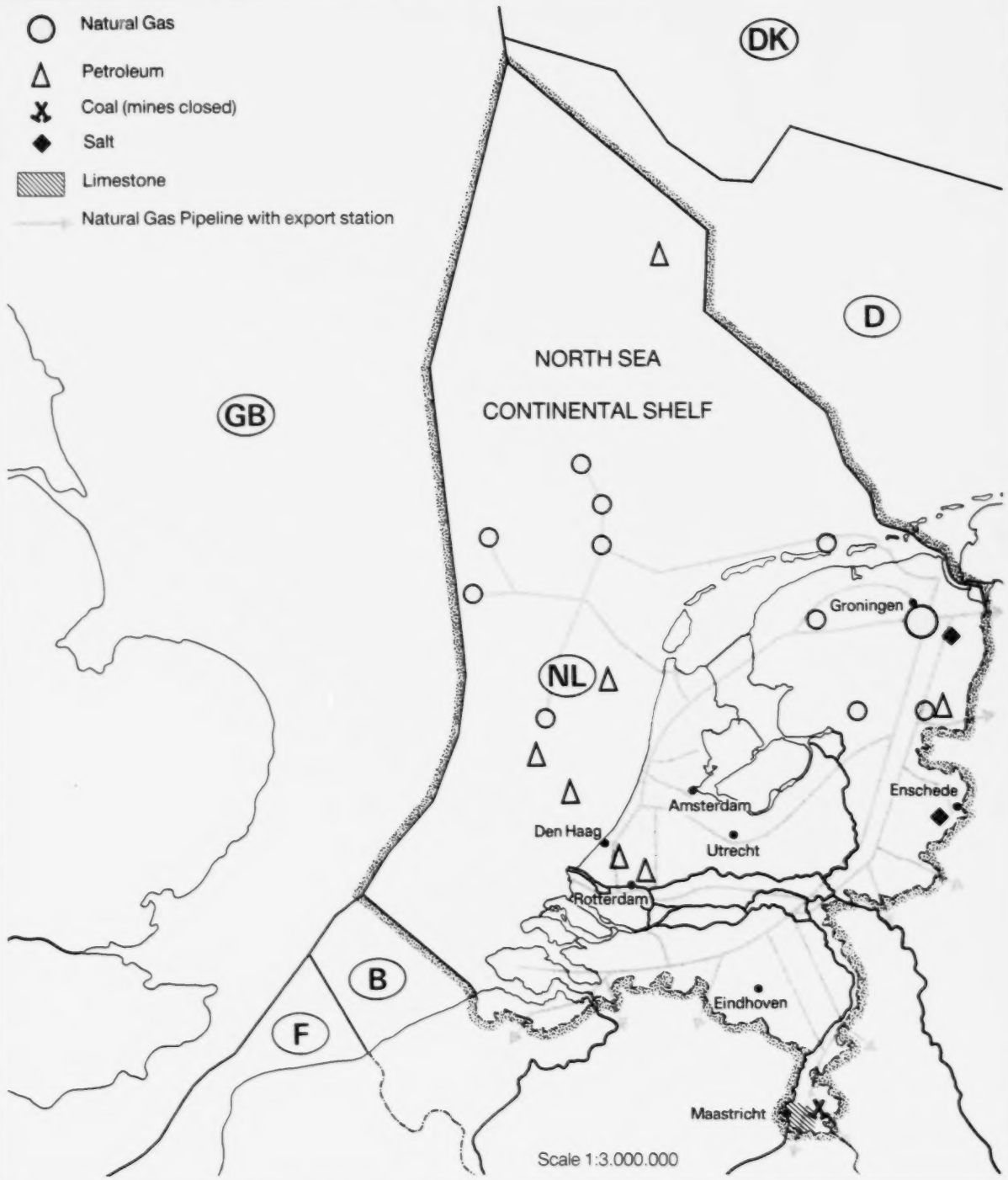
Other minerals
Petroleum, the third mineral which may be used as fuel and as a raw material for the chemical industry, also occurs in the Netherlands, although the quantities are very limited. Extraction is carried on in south-west Drenthe, in the area between Rotterdam and The Hague and under the North Sea. The refineries in the port of Rotterdam, which is one of the largest refining centres in Europe, process mainly imported oil (mostly from the middle East). The bulk of the finished products are re-exported.

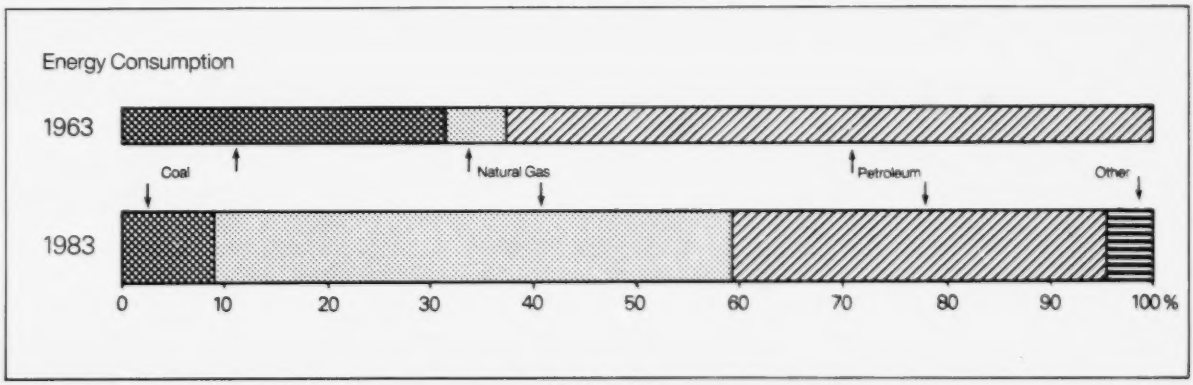
Dutch petroleum reserves (and those under the North Sea) account for less than 7% of the crude oil refined in the Netherlands and for about 14% of the domestic consumption of petroleum products (1983).

Common salt is pumped up in large quantities in the form of brine in the eastern and north-eastern Netherlands. Annual production is over 3 billion kilograms. The salt is processed at Hengelo and Delfzijl.

Surface minerals have been exploited for centuries. The limestone of South Limburg was formerly used as a building stone; it is now also used for the manufacture of cement and calcareous fertiliser. There have been violent protests against the damage done to the attractive hill landscape of South Limburg by the quarrying of limestone.

Peat, which was formerly important as a fuel, is now dug only in south-east Drenthe and used partly for soil improvement in horticulture. Clay, sand and gravel are used in the production of building materials, such as bricks, roofing tiles and concrete. Sand is obtained from the beds of lakes and the North Sea, as well as from sandpits in the High Netherlands. The main source of gravel is the deposits laid down by the Maas in the centre of the province of Limburg. The excavations there have created large lagoons alongside the river, which are now used for water sports. Clay for the manufacture of bricks and roofing tiles is mainly dug and processed along the great rivers.


Natural Gas
Petroleum
Coal (mines closed)
Salt
Limestone
Natural Gas Pipeline with export station
DK
D
NORTH SEA
CONTINENTAL SHELF
GB
NL
B
F
Groningen
Amsterdam
Den Haag
Utrecht
Rotterdam
Enschede
Eindhoven
Maastricht
Scale 1:3.000.000


Energy Consumption
1963
1983
Coal
Natural Gas
Petroleum
Other
0
10
20
30
40
50
60
70
80
90
100 %

Industry I

Introduction

On page 26, reference is made to the international orientation of the Dutch economy as a whole. This is certainly true of Dutch industry, the development of which is due much more to the country's situation in relation to communications than to the presence of large reserves of raw materials and fuels. The traditionally important foreign trade and shipping encouraged the growth of shipbuilding and the processing of imported raw materials.

History up to 1900

There was already a form of processing industry in the Netherlands in the 17th century. Dutch merchant ships brought such goods as grains and timber from the Baltic countries and tropical and subtropical products from the Far East and Mediterranean region. These raw materials were refined in such places as Haarlem, Dordrecht and the Zaan district (northwest of Amsterdam). The power was mainly supplied by the wind. Besides the windmills which regulated the water economy, the Netherlands formerly had countless wind-driven saw mills, corn mills etc. Peat was also used as a source of power supply.

Although these industries expanded further during the 18th and 19th centuries (together wich the industries based on locally grown agricultural products), there was no explosive growth in the Netherlands, such as occurred in Britain and Germany during the 19th century.

The 20th century

Not until 1890 did the Netherlands begin to find its place among the industrial nations. This was when the government began to play a more active part, mineral extraction in the form of coal mining began to gather pace and new industries, such as chemicals and electrical engineering were established. Two world wars and the economic depression, however, slowed down growth. After 1945 there followed a few years of reconstruction and adaptation to the changed international situation, including the gaining of indenpence by Indonesia.

The greatest expansion of Dutch industry took place after 1945, as is illustrated by the index figures given below for the total volume of industrial production:

(1938 = 100)

1930 - 96	1970 - 500
1946 - 74	1981 - 673
1958 - 204	1986 - 660

The result of this has been that, in 1983, 34% of the national income was derived from industry, while 84% of total exports consisted of manufactures. Labour productivity has greatly increased during this period, thanks to mechanisation and automation. The number of people in employment has been declining, both relatively and absolutely, since about 1970.

Other important new elements in the developments after 1950 included the great expansion of the petrochemical industry and the growth in foreign investment. It was mainly firms from the United States which established themselves in the Netherlands. Another important fact is that several major multinational concerns have their headquarters in the Netherlands. These include Philips, Shell and Unilever (the latter two have a second head office in London).

Reference has already been made on p. 26 to the stagnation of economic growth after about 1974 and, therefore, also that of industrial production. It can be seen from the index figures given above that the volume of industrial production even decline slightly at the beginning of the 1980s. This decline was limited to industries which have already been in the danger zone for twenty years. The production capacity of the chemical and metallurgical industries has already been underexploited for many years because of international economic stagnation, while the competitiveness of the light, labour-intensive industries has been adversely affected by the steep rise in wages.

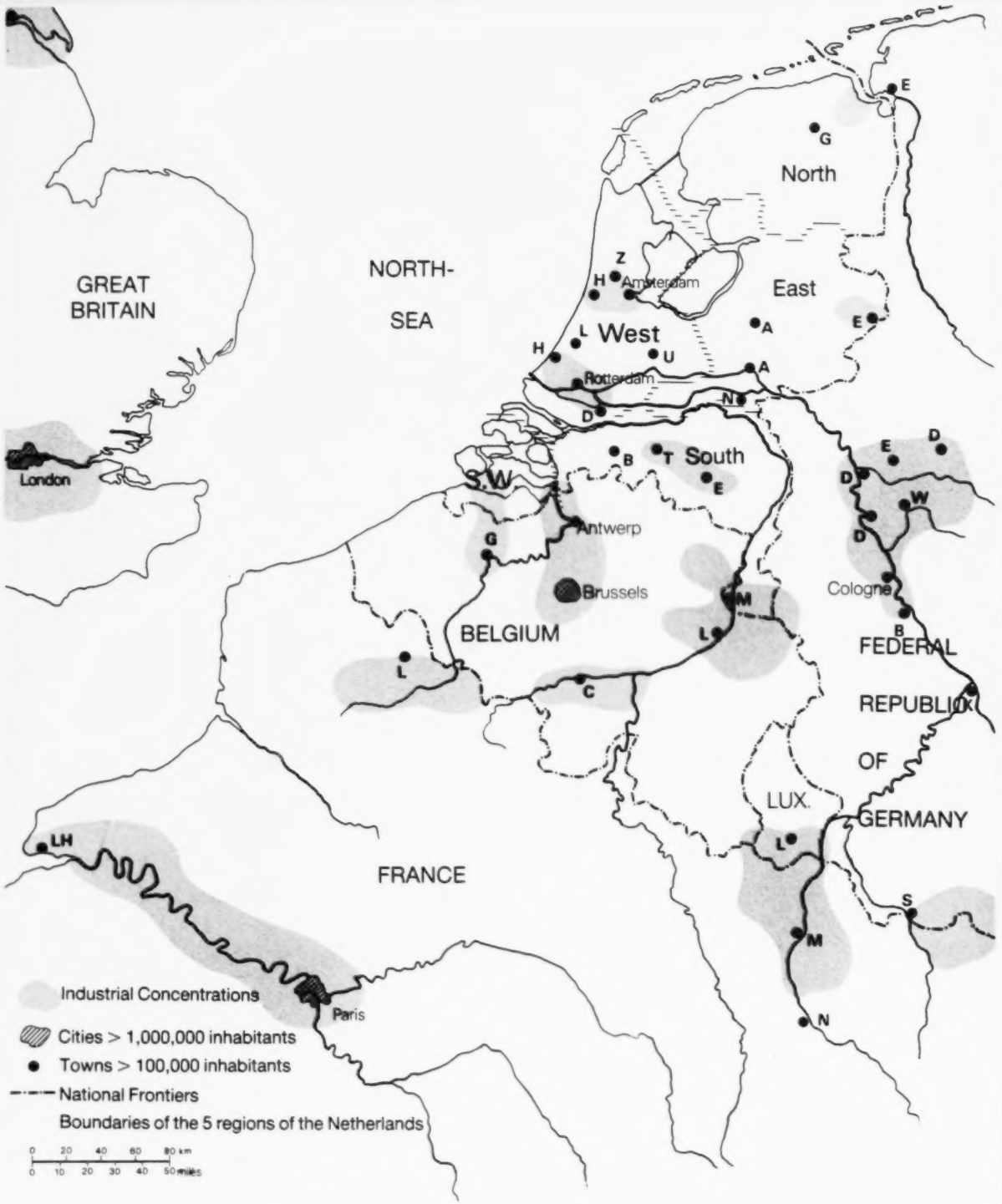
Since it was assumed up to the early 1970s that industry would continue to expand at a fast rate, there is now a surplus of vacant industrial sites in various parts of the country.

Location

The historical development described above makes it apparent that industry in the Netherlands has traditionally been concentrated in the ports. Later, industry also developed elsewhere in the country, partly with government support (see p. 26). Trends which have appeared in all industrial countries in respect of the choice of industrial locations have also played a part here. Firms preferably establish themselves in the vicinity of seaports (= relatively cheap transport) and in large urban agglomerations (= favourable industrial climate in relation to infrastructure, labour supply, markets etc.). Only the Randstad satisfies both conditions. In the other parts of the Netherlands industrial development proceeded with much greater difficulty. On the sandlands of the south and east the peasants formerly carried on cottage industries, from which developed the textile industries in towns such as Tilburg and Enschede. It is precisely these labour-intensive industries which now find themselves in great difficulties, partly because of international structural changes. The result has been factory closures and mergers.

Other areas, such as the province of Groningen and South Limburg, acquired industries when people began to process the locally available raw materials. In this way arose agriculturally-based industries in the north and the chemical industry in the south. The presence of deep, navigable water led, further, to the establishment of industry along the Western Scheldt in the southwest and along the Eems in the northeast of the country.

As a result of the decline of traditional industries, the establishment of foreign firms and of regional socio-economic policies, the distribution of industry over the country has become more complicated in recent years. There is no longer a limited number of regions, each clearly dominated by a single industry. In broad outline, however, it is still possible to point to a number of important concentrations, based on such factors as international communications. The bar diagram emphasises the degree of concentration of industry in the western coastal provinces and in the south of the country - centrally located between industrial regions in Germany and Belgium. The east and, particularly, the north lag well behind. In relative terms, however, industry is less important as a source of employment in the western Netherlands, because of the high concentration there of national and international service activities. The south is relatively the most dependent on industry.



Employment in Industry per Region as % of National Total, 1983

NORTH	EAST	WEST	S.W.	SOUTH
10.0	19.3	38.9	2.4	29.4

Industry II

The general introduction describing the origin and distribution of industry in the Netherlands will be followed by a description of three important industrial regions: the port and agglomeration-related industrial zones along the New Waterway (Rotterdam) and North Sea Canal (Amsterdam) and the restructuralisation region of South Limburg.

Rotterdam-Europort

Rotterdam was granted a charter in 1340 and rapidly increased in importance during the following centuries. This importance derived largely from its trade with America and the East Indies (now Indonesia) and from the ferry sevices with England. A decline set in during the 18th and 19th centuries, caused mainly by difficulties in maintaining a channel to the open sea. Silting made navigation increasingly hazardous, while ships were constantly increasing in size.

The opening of the New Waterway in 1872, which involved cutting through the dunes of the Hook of Holland, made it possible to benefit from the rapidly intensifying trading contacts with the German hinterland resulting from the rise of industry in the Ruhr region and the freeing of navigation on the Rhine in 1868.

Up to the Second World War, therefore, the emphasis was very much on transit trade. About 75% of the goods imported into Rotterdam from overseas in 1938 were immediately transshipped (the present proportion is 30-35%). The port zone expanded westwards from the centre of Rotterdam approximately as far as Schiedam.

After the war and the phase of post-war reconstruction, the expansion westwards, along the left bank of the New Waterway, continued at an intensified pace. First came, in about 1955, a port zone with mixed industry around the Botlek. Subsequently, in the 1960s, the Europort project was completed on the island of Rozenburg, with predominantly petrochemical industries. This did not entirely satisfy the desire for port and industrial sites, however, and 1974 saw the beginning of the layout of the Maasvlakte. With the dredging of a 40 kilometre channel in the floor of the North Sea, Europort has been made accessible to ships of up to 300,000 to 350,000 tons.

This spatial expansion was accompanied by a greater diversification of functions. Numerous industries were established around the new port basins, with petrochemicals predominating. There are five large oil refineries in the port of Rotterdam with a combined capacity of some 90 million tons. From east to west these are Shell, Esso, Chevron, the State oil company of Kuwait (Gulf until 1983) and British Petoleum. These are the 'balancing' refineries which supply the smaller refineries and chemical works in the West European hinterland with raw materials. The port also contains a number of chemical plants, while another important industry is the processing of vegetable oils and fats into foodstuffs and soap and washing powders (Unilever).

An important new activity is the offshore industry, which has grown rapidly in response to the increased exploration for oil and gas and their exploitation on the bed of the North Sea. The building and repair of ships has long been an important activity of the port. In recent years there has been a decline in the construction of large vessels, mainly because of greatly increased foreign competition. Partly because of environmental objections, it has been decided not to build an iron and steel plant on the Maasvlakte.

Amsterdam-IJmond (entrance to the North Sea Canal)

Up to the Second World War, Amsterdam played an important role in Western Europe as an entrepot for tropical products. Subsequently, transit trade gained in importance, but the city's geographical situation is much less favourable in this respect than that of Rotterdam. The connections both with the sea and the hinterland (the Rhine) consist of canals entered by locks: the North Sea Canal (1876) and Amsterdam-Rhine Canal (1952).

After the war the port and industrial zone of Amsterdam also expanded in a westerly direction. Amsterdam has the largest number of industrial workers of any Dutch city. In part, the pattern of industry shows marked parallels with Rotterdam: petrochemical and food and drink industries, shipbuilding and repair etc. Some of the industries of Amsterdam, however, are less tied to the port than those of Rotterdam and often have a craft character (clothing, diamond cutting).

The national airport of Schiphol is attractive to international concerns, which have established their European office and/or distribution centre in its vicinity.

An iron and steel works began operating at the seaward entrance to the North Sea Canal in 1924. Iron ore and coal have to be imported from overseas. In this respect, the works, with its own docks on the seaward side of the locks, has an ideal situation. Apart from crude iron, steel and steel products are manufactured, as well as cement and fertilisers in a subsidiary plant.

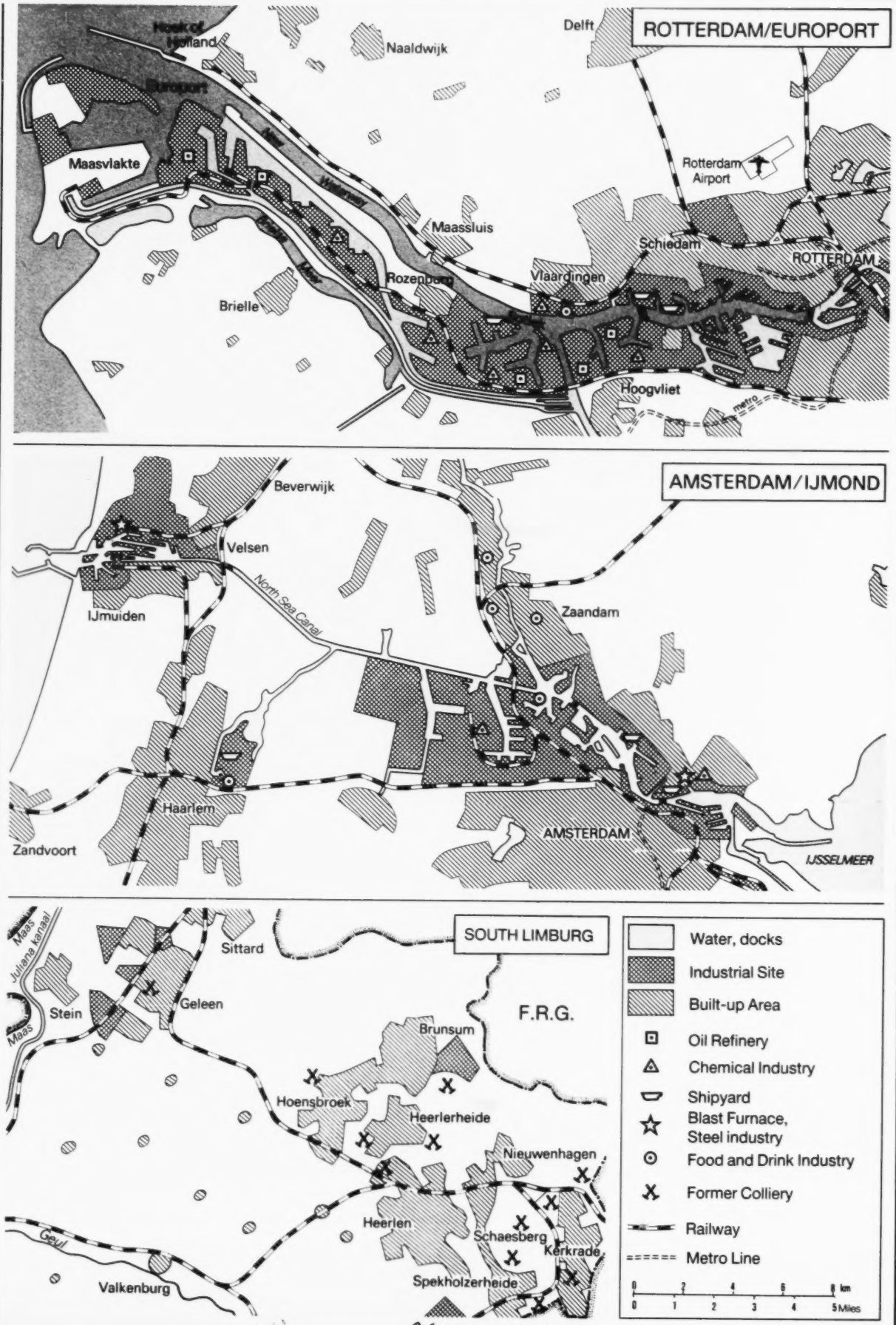
There are now seven blast furnaces and the steel works has an annual capacity of 6 million tons, which is not fully utilised because of the overproduction of steel in Europe. Collaboration with steel plants in West Germany, which has been going on for many years, resulted in a merger with Hoesch of Dortmund in 1972 under the name of Estel. This merger was dissolved again, however, in 1982.

A rapid growth of the offshore industry is also occurring in the IJmond zone.

South Limburg

Towards the end of the 19th century and during the first quarter of the 20th century, twelve coal mines were opened in South Limburg, financed at first with private capital, but later also operated by the State. Mining ceased here completely between 1966 an 1975. The exploitation of the generally deep and thin coal seams proved to be no longer economically justified. Greatly increased labour costs and competition from the natural gas discovered in the Northern Netherlands in 1960 largely contributed to this rapid and partly unexpected closure. This obviously confronted the region with great problems, particularly the eastern sector adjoining the German border, including Heerlen etc. This area was more exclusively dependent on mining than the western mining district, where a varied chemical industry had grown up. With the supply of petroleum and natural gas by pipeline this industry was able to continue after the closure of the coal mines. The largest complex here is that of DSM (Dutch State Mines), which consists of a polychemical plant (raw materials for plastics, paints and dyes, drugs and medicines etc.), a nitrogen fixing plant (for fertilisers) and a caprolactam plant (raw material for nylon).

In 1973 South Limburg was designated as a 'restructuralisation region' under the regional socio-economic policy. This provides for measures such as retraining of labour, establishment of new industries and an expansion of the number of jobs in the services sector (to be achieved in part by the transfer of government departments from the western Netherlands to Heerlen). Despite these efforts, the rate of unemployment in South Limburg is now running at over twice the national average.


ROTTERDAM/EUROPORT
Hoek of Holland
Europort
Maasvlakte
Naaldwijk
Delft
Rotterdam Airport
Maassluis
Schiedam
ROTTERDAM
Vlaardingen
Rozenburg
Brielle
Hoogvliet
metro
AMSTERDAM/IJMOND
Beverwijk
Velsen
North Sea Canal
IJmuiden
Zaandam
Haarlem
AMSTERDAM
Zandvoort
IJSSELMEER
SOUTH LIMBURG
Maas
Juliana kanaal
Maas
Stein
Sittard
Geleen
F.R.G.
Brunsum
Hoensbroek
Heerlerheide
Nieuwenhagen
Heerlen
Schaesberg
Kerkrade
Geul
Valkenburg
Spekholzerheide
Water, docks
Industrial Site
Built-up Area
Oil Refinery
Chemical Industry
Shipyard
Blast Furnace, Steel industry
Food and Drink Industry
Former Colliery
Railway
Metro Line
0 2 4 6 8 km
0 1 2 3 4 5 Miles

Trade and traffic

Foreign trade

The strong orientation of the Dutch economy towards foreign countries has already been referred to in previous sections. This is reflected in the large volume of foreign trade. In 1983 imports amounted to 12,200 guilders per head of the population and exports to 13,000 guilders per head.

Manufactures were the most important items in both imports and exports (e.g. import of motor cars and export of electrical apparatus). Second place amongst imports is taken by raw materials and fuels (iron ore, petroleum), while agricultural products (livestock and horticultural products) take second place among exports.

The first map on the opposite page shows the countries with which the Netherlands does the most trade. A striking feature is the large share of the nine EEC partners. In 1983 they supplied 54% of the imports and took 72% of the exports. The great importance of natural gas exports and international services for the Dutch balance of payments has already been referred to on p. 26. It is mainly thanks to natural gas that the trade balance has shown a surplus of some 10 billion guilders or over 6% in recent years (1982-83). The surplus on the services account, which was once of such significance, has largely disappeared. Although the Dutch transport undertakings (shipping, road transport) still earn a considerable surplus, this is largely cancelled out by the deficit from international travel. Dutch tourists spend annually some 5 billion more guilders abroad than are spent by foreign tourists in the Netherlands.

Inland traffic and transport

The infrastructure maps showing transport by water, rail and road indicate the density of these different traffic networks. The waterways map shows only those routes where the maximum permitted capacity does not fall below 1,000 tons. This accounts for nearly half the total waterway network of 4,380 km (the many apparently dead-end waterways are generally continued by channels of a lower order).

The railway map shows all the lines in use for passenger traffic. This network comprises over 2,500 km, besides which there are a number of lines for goods traffic only. The road map shows all the 'European' (E) roads, all the motorways and a limited selection of the other important link roads.

The road network is being continually extended and modernised. The total lenght of dual-carriageway roads was virtually doubled between 1970 and 1984. The numerous river and canal crossings form a hindrance to road traffic. Despite the building of an increasing number of major bridges and tunnels, these crossings still give rise to long peak-hour traffic queues.

A comparison of the road and rail networks, which exhibit a great similarity in broad outline, shows that road traffic takes advantage much more rapidly than do the railways of the opportunities afforded by land reclamation works. The 'Schiphol Line' between Leiden and Amsterdam, for example, which was built across the Haarlemmermeer, was not completed until 1981, while the railway across the Flevo Polders is planned to link Almere and Lelystad with the national rail network by 1987 and 1988, respectively. There are plans to extend this line through the North East Polder to Groningen. It now seems unlikely that the plans to construct a north-south line through the Delta region will ever be realised.

Aviation

The Netherlands possesses in the airport of Schiphol, southwest of Amsterdam and the home base of the KLM, an important and well-equipped airfield. Numerous airlines operate regular European and inter-continental services. Smaller civil airfields are situated near Rotterdam, Maastricht, Eindhoven, Groningen etc. Because of the short distances, internal air traffic is of very limited significance.

Government policy

The disadvantages of the uncontrolled growth of traffic and the associated infrastructure have become clear to many people in recent years. They include noise nuisance, air pollution, use of expensive space and energy, danger to life and limb. Recent government plans in the field of physical planning and traffic take these into account. Many aspects of amenity are given careful consideration before decisions are taken about extensions to the traffic infrastructure. Such decisions are the subject of detailed public participation procedures (see also p. 38).

In making the decisions, the aim is to achieve integration in a number of fields:

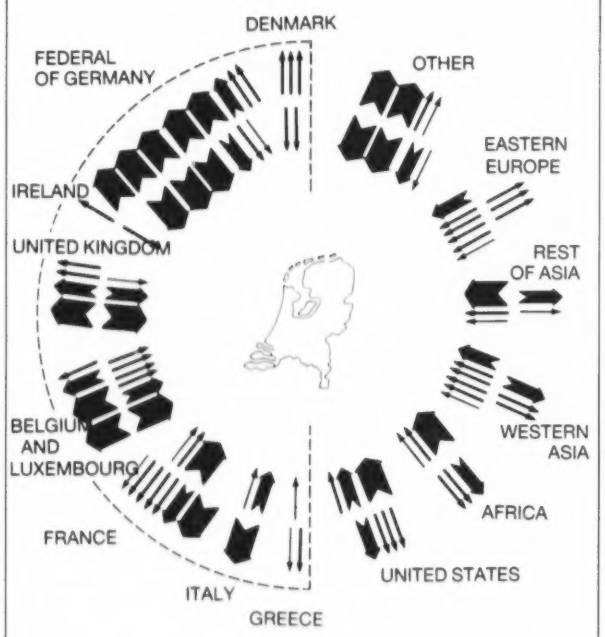
- integration of transport and other sectors of physical planning; for example, bringing work and recreation closer to residential areas reduces the volume of traffic;

- integration of the different forms of transport: depending on local conditions, priority is given to infrastructure provision which will help motor traffic, public transport or the use of bicycle and moped;

- integration in the policy sphere between the various authorities themselves and between the authorities and the transport companies.

It is hoped to reduce the mobility of the population by means of a variety of control measures relating not only to the number, but also to the length of journeys.

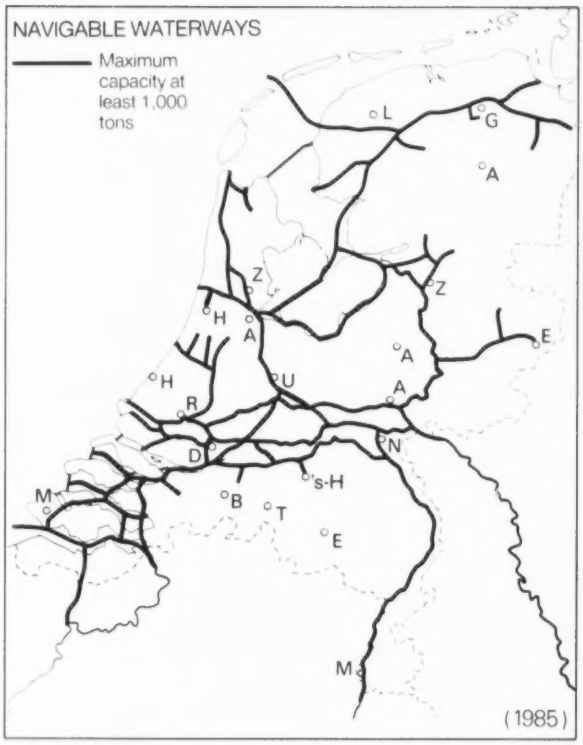
VALUE IMPORTS AND EXPORTS



(1983)

10,000 million guilders
5,000 million guilders
1,000 million guilders
500 million guilders

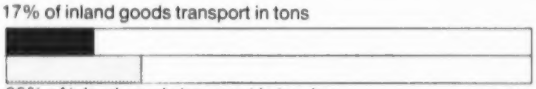
NAVIGABLE WATERWAYS



(1985)

INLAND SHIPPING

17% of inland goods transport in tons



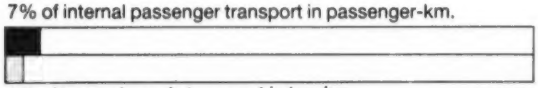
26% of inland goods transport in ton-km (1983)

RAIL NETWORK

(1985)

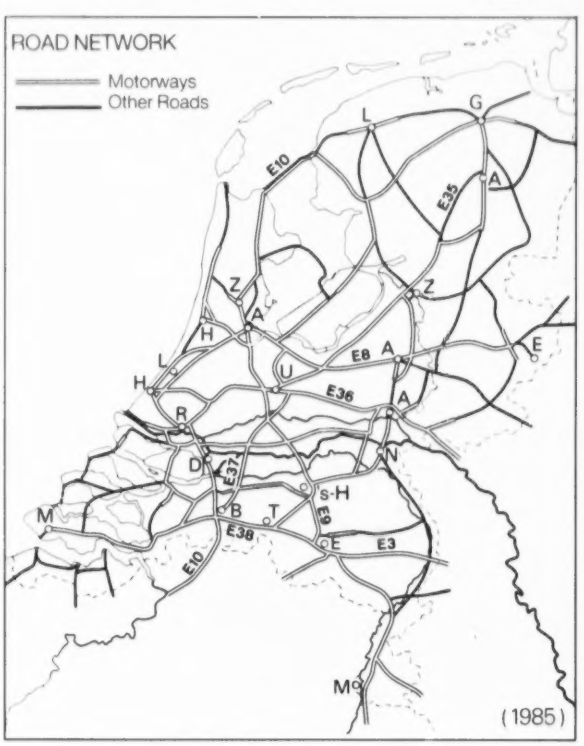
TRANSPORT BY RAIL

7% of internal passenger transport in passenger-km.



4% of internal goods transport in ton-km. (1983)

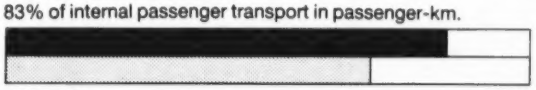
ROAD NETWORK



(1985)

TRANSPORT BY ROAD

83% of internal passenger transport in passenger-km.



69% of internal goods transport in ton-km. (1983)

Physical Planning I

Evolution

In a densely populated country like the Netherlands, it is obvisiously essential to prepare and implement plans for the future spatial organisation of the country. This necessity is determined not only by the high population density and the associated intensive use of space, but also by the great reduction in the amount of available space *per inhabitant*.

There is, moreover, particularly in the Low Netherlands, a long tradition of physical planning, because it was customary to prepare plans not only for the drainage of the many areas reclaimed from the sea, but generally also for their layout.

The legal framework for contemporary planning is contained in an act of 1965, which was passed at the end of a long period of evolution, beginning with the Housing Act of 1901. As a result of recent developments further legislation is in the course of preparation.

The following are some aspects of post-war developments:

- physical planning was given a more scientific basis in the development of 'planologie' (planning science);
- an interest in rural planning was added to that in urban planning;
- in association with the above, there has been an enlargement of scale: physical planning should be practised not only in response to local problems and interests, but also at the regional, national and international levels;
- the principle of establishing a structure for a particular point in time in the future has been replaced by an attempt to achieve a more flexible response to constantly changing trends (this is known as 'process planning');
- greater thought is being given to the place of physical planning within the whole field of social forces and, particularly, to its relationship with regional economic policy;
- more opportunities have been created for public participation in planning policy, particularly at the national and local levels.

Organisation

The organisation of physical planning in the Netherlands as laid down in the act of 1965, is based on the three existing levels of government: central, provincial and municipal.

Central government sets out the main lines of planning policy documents and structure plans. It also exercises supervision over the policies of the lower tier authorities and settles differences between them. The *provinces* may draw up sub-regional plans for parts of their areas and they exercise supervision over the policies of the municipalities.

The act of 1965 assigns a very important task to the *municipalities*. In addition to the structure plans for the whole of their territory, they draw up development plans. These development plans are the most important element of the present system of physical planning. They differ from all the previously mentioned plans in that:

- the municipality is *obliged* to prepare them for the parts of its area which are undeveloped and they are sometimes also prepared for other areas, such as a town centre which is to be redeveloped.
- once accepted by the municipal council and approved by the province, the provisions of the development plan are *legally binding* for everyone. Building licences are issued only if they are in conformity with the development plan. Failure to conform to the plan results in prosecution, while any structures are demolished at the offender's expense.

The map page illustrates the increasing detail of the plans at the regional, local and neighbourhood levels. Map A shows part of the *regional scheme* for the central and south-eastern part of the province of Utrecht, published in 1974. The plan provides for the considerable expansion of a number of settlements to the south of the city of Utrecht to accommodate the overspill of the city's population. The largest of these settlements is Nieuwegein, a new town to be built around the old nuclei of Jutphaas and Vreeswijk. Map B is an extract from the *Structure Plan* for Nieuwegein, drawn up in 1969. Below it is a section from the *Development Plan* for one of the residential neighbourhoods in Nieuwegein. This plan has now been implemented.

Public Participation

Legislation has been passed providing for detailed information and public participation procedures in respect of all the plans, policy documents etc. referred to above. In general, the procedure is as follows: firstly, a draft plan is published by the authority concerned and maximum publicity given to it by means of laying it open to inspection in numerous places, public meetings, notices in the mass media etc. Every citizen or interest group may comment on the plan, either in writing, or verbally at a public hearing. As far as national policies are concerned, a compilation of these comments is published as part of the 'Planologische Kernbeslissing' (Key Planning Decision) procedure. The authority then draws up a definitive plan, which takes the comments into account and has to be democratically approved by Parliament, the provincial states or the municipal council, as the case may be.

In view of the binding character of the municipal development plan, it is the procedure for this plan which contains the most safeguards for the public. There are, for example, ample opportunities for appealing against a development plan or for claiming compensation.

Drawbacks

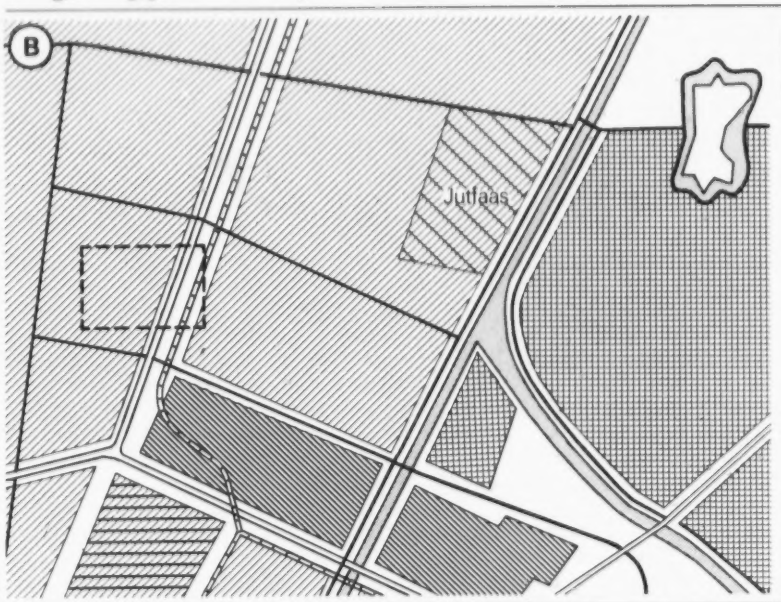
The existing legislation has been found to contain a number of drawbacks, which it is hoped to overcome in future amendments to the law. The strong emphasis on the municipal development plan, for example, does not accord with the efforts to achieve economies of scale.

Another drawback is that the wide opportunities for appeal can result in lengthy delays, so that the implementation of a development plan may be delayed by as much as four or five years.

It is intended that a revised Physical Planning Act should come into force in 1985. Its provisions will include the public participation procedure for the 'Key Planning Decision' referred to above. In view of the large amount of time and money required by the experimental procedure adopted until now, a simplified version will be incorporated in the new act.

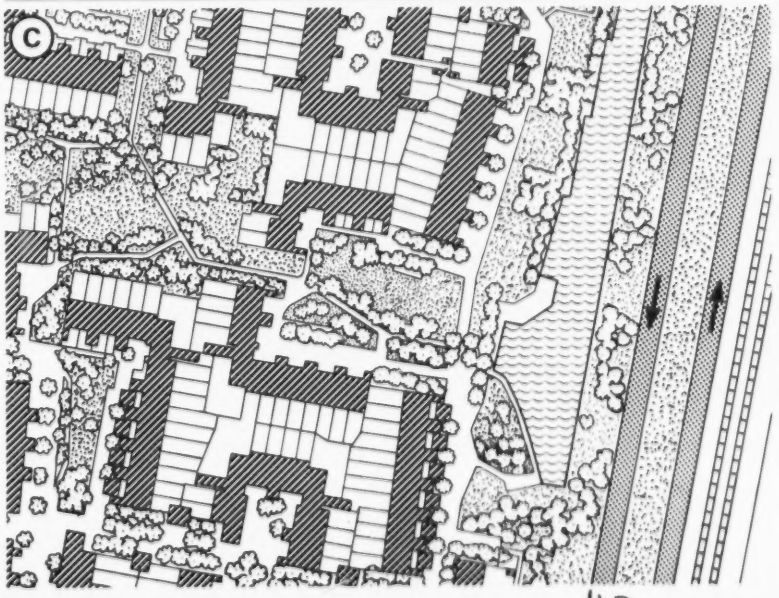
A. REGIONAL SCHEME
FOR CENTRAL
AND S.E. UTRECHT
(extract), scale 1 : 100,000

- Residential area
- Work Area
- Park Area
- Agricultural Area
- Motorway
- Railway
- Express Tramway
- Canal
- Limit of Map B



B. STRUCTURE PLAN
FOR NIEUWEGEIN (extract),
scale 1 : 20,000

- Residential area
- Existing Development
- High-Rise Development
- Work Area
- Central Area Facilities (city centre)
- Roads
- Express Tramway
- Limit of Map C



C. DEVELOPMENT PLAN
FOR DE BATAU
(extract) Scale ca. 1 : 2,400

- Single family houses
- Gardens
- Public Open Space
- Trees
- Water
- Road
- Express Tramway

Physical Planning II

Government Reports

After the First and Second Policy Documents on the physical planning of the whole country, which appeared in 1960 and 1966, respectively, publication began in 1974 of the separate parts of the Third Policy Document on Physical Planning in the Netherlands. The need for this new report, quite soon after the detailed Second Document, derived mainly from the following considerations:

- certain basic assumptions, concerning, for example, population growth, proved to have been incorrect (see p. 18);
- important elements of the policy outlined in 1966, such as the migration to the North and the restriction of suburbanisation in the central zone of the Randstad, proved impossible to realise;
- assumptions about such matters as the achievement of economic growth and the increase of mobility were being radically modified in response to the growing concern for the environment and the scarcity of fuels and raw materials.

The first part of the Third Document, the 'Exploratory Report', published in 1974, was concerned with these background aspects and took them as a basis for a number of policy proposals.

The 'Urbanisation Report' was published in 1976 as part two of the Third Document and the 'Rural Areas Report' appeared in 1977 as part three. A revised edition of the 'Structure Map' (see map) forming part of the 'Urbanisation Report' was published in 1983. The map on the opposite page illustrates the major structural elements of the Urbanisation an Rural Areas Reports.

Besides the three reports there are the 'Structure Schemes', which deal with particular aspects of physical planning, usually relating to infrastructure. Proposals have been put forward, for example, relating to domestic water and electricity supply, to inland waterways, ports, airfields, public housing, land use planning, open air recreation and conservation.

Urbanisation Report

The Urbanisation Report refers to a number of conurbations in the West of the country which partly overlap each other to form the northern and southern wings of the Randstad. This is where the greatest problems are located. The stringent dispersal policy adopted during the 1950s and 1960s to solve these problems has been largely abandoned. Further urban growth must be accommodated within or in the vicinity of the Randstad wings.

The displacement of part of the urban growth to peripheral areas in the North East and South East of the country is now being promoted less forcefully. By concentration in the conurbations and accomodation of the growth in a limited number of growth towns outside the Randstad and in growth centres in or near the Randstad, it is hoped to prevent both urban decay and the gradual suburbanisation of the whole country. This is the principle of 'concentrated deconcentration'.

Within the agglomerations the problem of congestion, as it affects homes and traffic, recreation and the environment etc., must be tackled. Among the means of achieving this are the bringing closer together of home and work and encouragement of the use of public transport and of bicycles or mopeds.

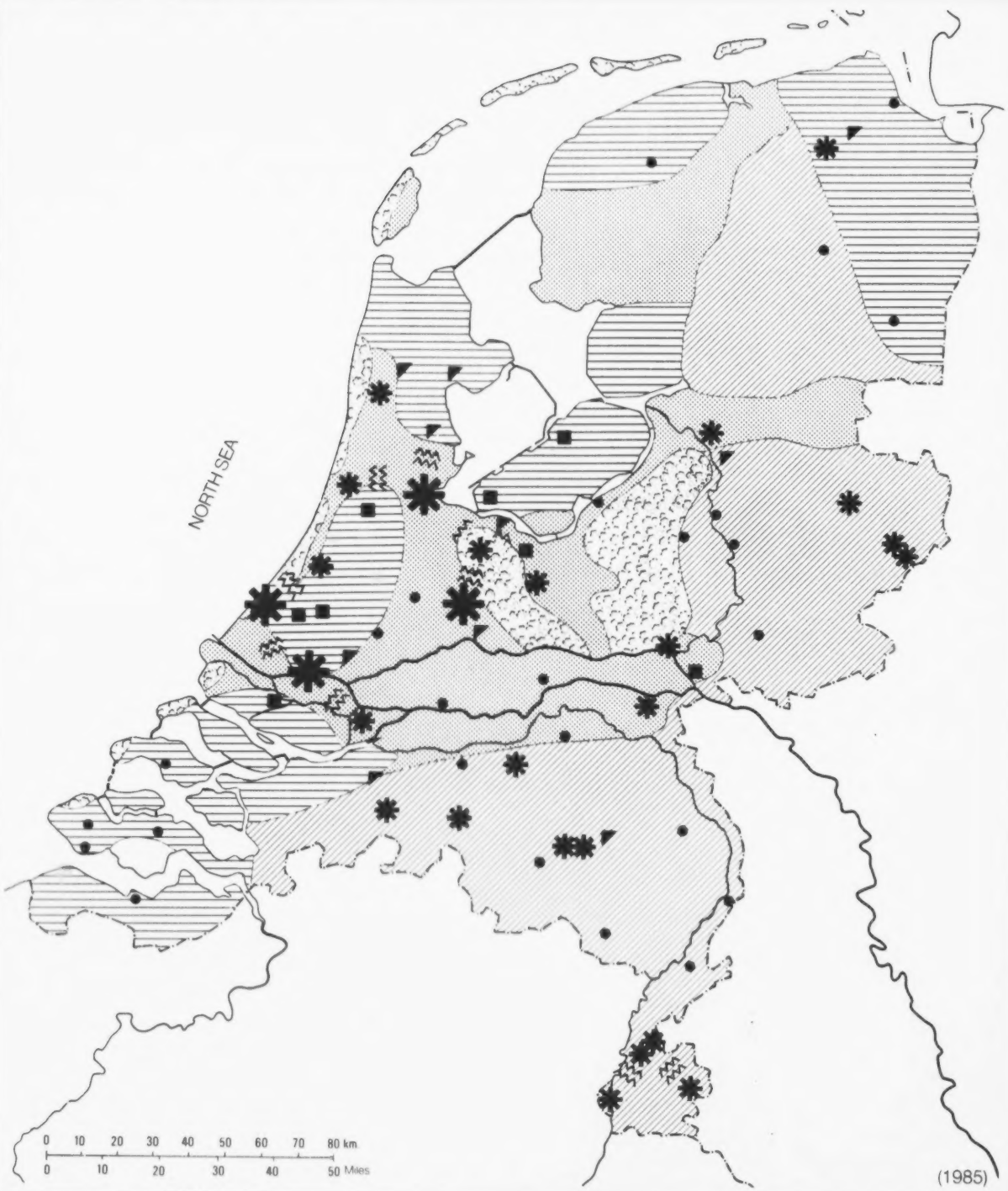
The quality of the urban residential environment must be preserved or improved, mainly through rehabilitation of the older urban neighbourhoods (cf. p. 24). This may also help to restrain the widespread suburbanisation process (cf. 22).

In the revised urbanisation plans of 1983 even more emphasis is placed on providing new housing within and adjacent to the existing towns and cities. No new growth towns or growth centres have been designated and a number of the existing growth municipalities will shortly lose their special status.

Rural areas

Clearly underlying the Rural Areas Report is the realisation that the non-urbanised part of the country may no longer be regarded purely as an area for agricultural production. Joint use by the non-agricultural population and concern for nature conservation are playing an increasing role. In view of the often conflicting interests, this does not make the taking of decisions about the physical planning of rural areas any simpler. In order to bring some clarity into the situation, the Rural Areas Report introduces a system of zoning upon which planning policy can be based. The following zones are distinguished:

a. areas with agriculture as the principal function. The first purpose of the policy here will be to serve the interests of agriculture. The areas concerned include the marine clay districts in the North and South West Netherlands and in the IJsselmeer polders.
b. areas with a mixture of agriculture and other functions in larger spatial units. According to circumstances, agricultural interests or those of recreation and nature conservation will take first place. The area concerned are mainly the grassland areas on clay and peat soils, as in Friesland and the region of the great rivers.
c. areas with a mixture of nature areas, agriculture and other functions in smaller spatial units. Preservation of attractive, varied countryside should receive priority here, but the interests of agriculture must not be overlooked. This category is to be found mainly on the sandy soils in the East and South of the Netherlands.
d. areas with 'nature conservation' as their principal function. Conservation obviously takes first place here and the interests of agriculture and recreation are subordinated to it. The areas concerned include the dunes along the whole of the North Sea coast and the forests and heaths covering the hills of the Veluwe.



Rural Areas

- Areas with agriculture as principal function
- Areas with a mixture of agricultural and other functions, in larger spatial units
- Areas with a mixture of nature areas, agricultural and other functions in smaller spatial units
- Areas with 'nature conservation' as principal function

Urbanisation

- Conurbations
- Growth Centres/Towns ceasing to have special status in the 1980s
- Growth Centres/Towns to continue to have special status until the 1990s
- Other Urban Centres
- Buffer Zones

The Environment

In all the industrialised countries increasing pollution of both the natural and the man-made environment may be observed. Coping with the problem requires ever greater sacrifices. In the Netherlands, the pollution problem has certain specific aspects which are closely linked with the geographical situation of the country. The maritime situation, for example, together with the low-lying character of the coastlands, gives rise to a serious salination problem. The great European rivers, the Rhine, Maas and Scheldt, transport many waste products to the Netherlands. The high population density and the associated intensive use of land also increase the intensity of all forms of pollution. The prevailing south-westerly winds carry inland air pollution from the industries established in the coastal areas.

Water pollution

The ground and surface water are polluted in the first place by the settlements and industries in the country itself, but added to this is the heavily polluted water brought into the country by the great rivers, particularly the Rhine. Many measures are being taken on an increasingly large scale, both to remove the causes of pollution (e.g. by limiting or prohibiting discharges) and to deal with its consequences (e.g. sewage treatment plants).

A completely different threat to water quality is that of saltwater seepage. In rivers and canals the salt penetrates many kilometres inland from the sea. In large parts of the Low Netherlands fresh ground water is either absent or present to only a shallow depth (see the boundary on the opposite map and the cross-section on p. 17). This threat demands quite different measures, such as separation of fresh and salt water by means of dams (as in the Delta Project), air bubble screens in lock complexes and the construction of dams and weirs to ensure an adequate discharge of fresh water (see p. 16).

Air pollution

Large complexes of basic industries, such as the petrochemical industries of Rotterdam-Europort, are the greatest culprits with regard to air pollution. In addition, there are offensive smells caused by traffic and polluted surface water etc. Countermeasures up to the present have been very incidental in character, e.g. the installation of dust filters in chimneys etc. A network of 220 measuring stations came into operation in 1978. Only in the area around Rotterdam, where such measuring stations have been in existence for several years, can unfavourable readings lead immediately to the adoption of measures based on voluntary collaboration by industry. The conversion from coal and oil to natural gas during the course of the 1960s had a favourable effect on pollution (cf. p. 30). However, since industry and electric power stations have partly resumed the use of coal, this effect has to a certain extent been reduced. Like the whole of Western Europe, the Netherlands is suffering from the rapidly worsening problem of acid rain, the effects of which are clearly evident in the country's few woodland areas.

Soil pollution

Instances of severe soil pollution as a result of the discharge or dumping of chemical waste have been discovered in recent years in numerous places in the Netherlands. In a number of cases residential areas subsequently built on contaminated land had to be temporarily evacuated or even demolished. A growing number of refuse incinerator plants have come into operation in order to reduce the discharge of domestic and industrial waste; household waste is also used to make compost. In collaboration with industry, the government is investigating new methods of disposing of chemical waste and seeking a method of collecting small amounts of chemical waste.

Another form of soil pollution is caused by the considerable growth in intensive husbandry (see p. 28), particularly in the Eastern and Southern Netherlands. The surplus manure spread over agricultural land pollutes the soil (partly through and excess of nitrates an phosphates) and the ground water. This can in the long term have an unfavourable effect on the drinking water supply, two thirds of which is derived from ground water. The ammonia released by the manure contributes further to the acidification of the soil and air.

In order to combat this problem, the Minister of Agriculture prohibited the further expansion of pig and poultry rearing throughout the country at the end of 1984.

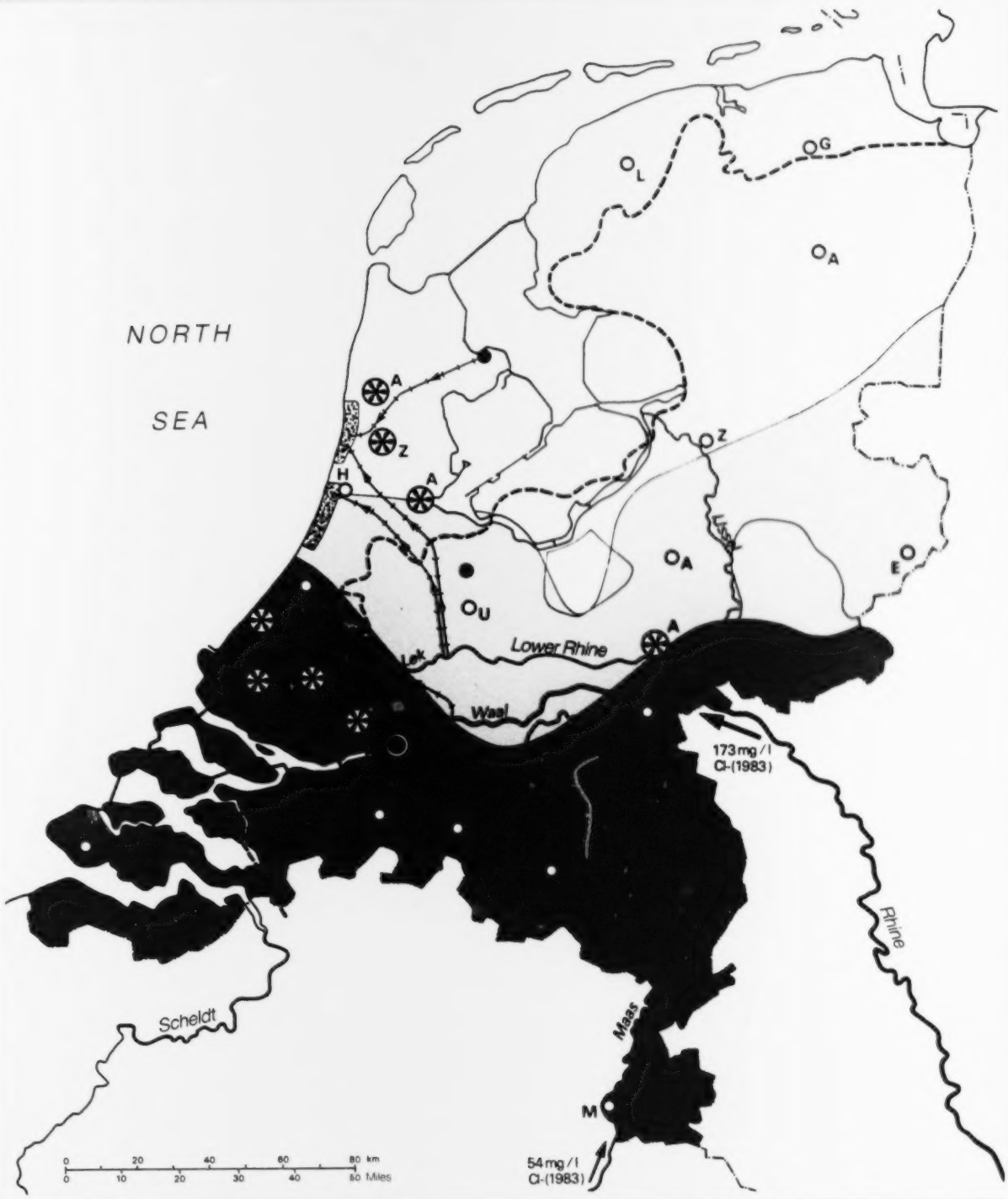
The soil is also polluted as a result of the dumping of contaminated sludge dredged up in order to maintain the navigability of port basins and waterways. This is a problem of considerable proportions, especially in the vicinity of Rotterdam. Plans exist to build special basins along the coast in the Maasvlakte area to store the most highly contaminated sludge.

Legislative measures

The cooperation of industry and all parties involved is necessary if the forms of environmental pollution referred to above and others, such as the thermal pollution of surface water, radio-active contamination of water and air, noise nuisance etc., are to be countered effectively. Furthermore, most of them can only be tackled with the aid of efficient legal measures. In 1970 laws came into force dealing with water and air pollution; in 1977 followed a law dealing with the pollution of seawater and a chemical waste act. The Environmental Protection (General Provisions) Act coordinates the procedural aspects of the various environment acts. They are all based on the principle that pollution as such is forbidden. Under certain conditions exemptions may be granted from this prohibition, for which the 'polluter must pay'. The money received by the government in this way can be invested in the fight against pollution.

International aspects

As noted above, features of the geography of the Netherlands – such as its situation on the lower reaches of various great rivers – make the environmental problem there an international one. The chief factor is the Rhine, which brings in no less than two thirds of all the water present in the Netherlands. Before this river passes the Dutch frontier it flows among the homes and workplaces of many tens of millions of Europeans. The Rhine is consequently Europe's most polluted great river and improvement in this situation can only be the result of close international cooperation. Talks have been going on for several years with France, for example, concerning the discharge into the Rhine of waste salts from the potash mines in Alsace. International agreement is also urgently necessary to combat pollution from the Maas, the Waddenzee, the North Sea etc. The map illustrates another example of transfrontier pollution: the high sulphur dioxide content of the atmosphere in the South East Netherlands, largely caused by industry in the nearby Rhine/Ruhr area.



Sulphur Dioxide in the Air:
1982/83

- ⩽ 60 microgrammes/m³
- > 60
- > 70
- > 80
- > 100
- > 120

Drinking Water Supply

- Drinking Water Reservations
- Dune Filtration Areas
- River Water Aqueducts
- Boundary of Salt Penetration in Ground Water
- Concentration Areas of Intensive Husbandry (excess manure)
- Refuse Incinerator Plants

HH